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for vat printing cotton, rayon and silk

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AMERICAN
DYESTUFF REPORTER

VOLUME 43 MARCH 15, 1954 NUMBER 6

NATURAL DYEWOODS AND THEIR APPLICATION*

H R TISDALE

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A Subsidiary of United Dye and Chemical Company
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Following a brief presentation on the history of logwood, the author successively discusses the habitat, chemical nature and methods of manufacture and processing of the natural dyewoods.

The bulk of the paper is devoted to a discussion of the application of the dyewoods to silk, wool, cotton, leather, nylon, acetate rayon, wood, hog bristles and furs, and their use in lakes and pigments and rustproofing.

HISTORICAL

THE discovery of America in 1492 is a good date to remember in relation to the discovery of logwood by Spanish explorers in 1500 in the Bay of Campeche in Central America. Its use did not assume importance, however, until after 1810, when a French chemist by the name of Chevreul discovered the coloring principle of logwood and found that the coloring matter would combine with metallic salts to form insoluble color lakes. This research showed that logwood was a mordant type of dyestuff and should be applied as such. It was not until the year 1842 that a German chemist (Erdmann) called the coloring principle of logwood by the name of hematoxylin, probably due to the resemblance to the deep red color of hemoglobin of the blood when the logwood is dissolved in an alkaline solution.

HABITAT

The natural dyewoods are found only in latitudes where there is a large annual rainfall. This rather confines the growth of the trees to the latitude of Central America and the northern part of South America, the islands in the Caribbean Sea, and the west coast of Africa. The dyewoods, such as logwood, fustic and hypernic, are found in Mexico, Cuba, Nicaragua, Venezuela, Jamaica and Haiti.

The coloring matter is contained in the wood of the trees and not in the bark. The trees reach maturity in ten to twenty years and thereafter become a cash crop in those countries where there is a demand for the wood.

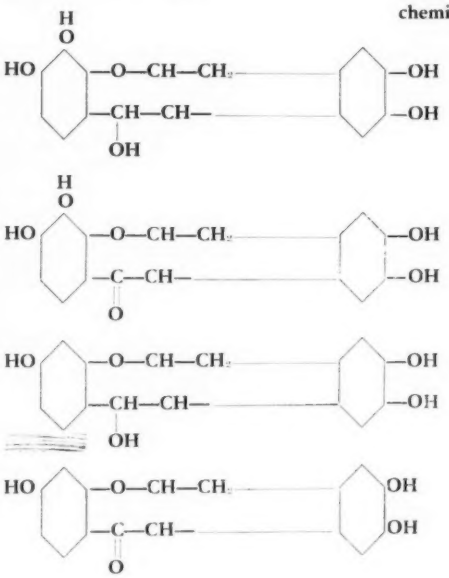
In some localities the trees near the sea coast have been cut down and sold. Forests further inland are accessible only if adequate transportation is furnished to bring the logs to the coast for transhipment by lighters to ocean going vessels. This expense of transportation is one of the important factors entering into the cost of the finished products sold to consuming industries.

* Prepared for the Senior Class, Department of Textile Chemistry and Dyeing, Philadelphia Textile Institute, Phi'adelphia, Pa.

CHEMICAL

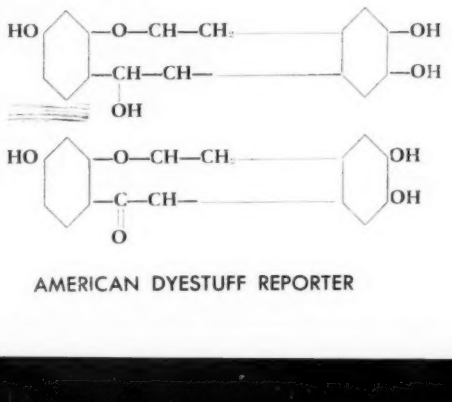
Hematoxylin $C_{16}H_{14}O_6 + 3H_2O$

Hematine $C_{16}H_{12}O_6$



Hematoxylin

Hematine



Brazilin $C_{16}H_{14}O_5$

Brazilein $C_{16}H_{12}O_5$

Pure hematoxylin forms colorless crystals ($-3H_2O$) that are slightly soluble in cold water and easily soluble in hot water. Hematoxylin oxidizes easily on contact with air to form reddish crystals with green metallic luster and in this case is only slightly soluble in hot water. It is an adjective or mordant dyestuff giving the following colors:

alumina—blue
chrome—blackish blue to black
iron—black
copper—greenish black
tin—violet.

Both Green and Shultz place a question mark in the structural formula indicating that there is some doubt as to the exact arrangement of the atoms. The same question is raised in the case of the structural formula of Brezilin and Brezilein.

It is thought that the coloring matter exists in the wood as a glucoside, which develops into coloring matter on fermentation. The question of the exact chemical structure is of interest mainly to the chemist who would try to manufacture

hematoxylin from simple compounds starting with benzine, for instance, or some other cheap base. The practical dyer is concerned only with what results he can obtain using either the unoxidized or oxidized form of logwood in the particular fibers or other material that he wishes to color.

MANUFACTURE

All of the main natural dyewoods are treated in the same way in order to obtain the coloring principles. The logs are split up to a size which will go into the "hog" or chipping machine. The chips of wood are then fed into a closed autoclave or into an open wooden vat. Generally a battery of vats are hooked up in series. The chips are subjected to a certain cycle of extraction times so that the largest amount of color may be obtained from each vat. The extracted color is obtained in a weak solution, which is concentrated in a series of vacuum pans or dehydrators. It can be carried down to a gravity of 51° Tw and after being standardized so that uniform strength for each lot may be obtained, may be held in reserve tanks and put in hard wood barrels and sold. It can be dehydrated down to about 75 to 80% solids and run into molds, which after cooling to room temperatures become solid extracts. It can also be run into pans and placed in vacuum drying ovens where the moisture content can be taken to five or six per cent. The crust that forms in the drying pans is removed, broken up and screened to form the so-called dyewood crystal.

While the unoxidized logwood is treated as mentioned above, the oxidized logwood requires an intermediate treatment before it is sent to the evaporative pans. It has been mentioned that the coloring principle (hematoxylin) of logwood is easily and quickly oxidized to hematine in contact with air. The reaction takes place even more rapidly in the presence of alkali. Over the years it has been found that better results are obtained by using logwood with certain degrees of oxidation for particular materials. For example, in dyeing most vegetable matter, such as cotton, for speck dyeing, for manufacture of lakes or any operation where one wishes the development of the black color to take place later in the coloring operation, best results are obtained in starting with an unoxidized logwood extract or at least with a product that has been subjected to the normal amount of oxidation which occurs during ordinary manufacture, i e, about 15 to 20%. This means that 15-20% of the hematoxylin has been converted into hematine. The balance of hematoxylin is converted later in the coloring operation. It is the combination of the hematine with the metallic part of the salt used which produces the insoluble lake such as iron hematate or chrome hematate. For dyeing wood blocks or vegetable ivory buttons, we have found that an oxidation of 35 to 40% is best. When one delves into the dyeing of protein matter, which generally requires an initial mordant treatment, such as on silk or wool, a higher degree of oxidation is desirable. In dealing with a package dyeing machine with total absence of outside air, a very high degree of oxidation may be tolerated. When one is dyeing woolen piece goods on an open winch machine with access to plenty of moist air, an oxidation of about 70-75% will prevent an overoxidized hematine lake form which has a brownish cast.

Each of these different degrees of oxidation may be controlled by the amount of alkali used, the amount of air blown through the weak logwood solution, and the time taken for the operation. (It takes about 8 or 9 hours of blowing to get an oxidation of 70 to 80%.)

After the required oxidation is reached, the solution is tested for total color and oxidation and then run into the evaporators for further refining.

APPLICATION

A) SILK———To obtain a "pure dye logwood black", the well-boiled-off silk is worked for an hour in a red iron mordant standing at 10° Be to 20° Be, depending upon the depth of shade desired. The red iron mordant sometimes called "nitrate of iron", is used at normal room temperature. The silk picks up iron as a hydrate, which is later converted into an oxide of iron. After the iron-mordanted silk is washed several times in cold water, it is dyed in a bath containing about 25% of hematine paste, 5% of fustic extract and 30% of olive oil soap. Brighter and deeper blacks are obtained by giving the silk a separate bath containing about 10% of fustic extract at the boil. After the silk is washed in warm water, the hematine and soap are applied in a fresh bath. Fustic extract is more acid than the hematine and if it is used in the last dyebath, it tends to kill the soap with the result that the black is not as bright as when the fustic is applied in a separate bath.

Real silk is still being dyed using the above formula though not in the volume of 15 to 20 years ago. The above formula applies to silk in yarn or skein form.

For silk pieces goods an entirely different formula is used. The silk is first given a bottom of fustic extract and then a large amount of copperas (ferrous sulfate) and bluestone (copper sulfate) is added to the bath. It takes about 2 hours to perform this first operation, from which an olive drab shade is obtained. The silk is washed well and then dyed with hematine and soap in a fresh bath. The cheapest fast logwood black is obtained by first treating the silk in a bath containing 1% of bichromate of soda and 1% of sulfuric acid for one hour at the boil and, after washing well in warm water, the silk is dyed out with 30% of hematine paste and 5% olive oil soap.

Years ago a great amount of real silk was weighted from 25% to 200% with tetrachloride of tin, passed through a solution of sodium acid phosphate and then through a solution of silicate of soda. Sometimes two or three passes were made through the tin and phosphate solutions. Tin-weighted silk, without the silicate, was further weighted by treating with a strong unoxidized logwood solution. In this case dyeing was completed in a bath of hematine and soap.

Some silk is treated first with red iron mordant and dyed with hematine and soap. The silk is then passed through a 4° Tw solution of black iron liquor, wrung out, and allowed to oxidize over night. The next step is to wash the treated fiber well in cold water and fix the iron by a passage through a Gambier bath. After further washing, the silk is dyed with hematine and soap.

In addition to those mentioned, there are many other formulas making use of logwood for the dyeing of real silk.

B) WOOL———There are three main formulas used in the dyeing of wool with logwood:

1) Sweet chrome mordant or chrome and sulfuric acid;

2) Chrome tartar bluestone mordant, and

3) One-bath mordant.

In the first method, the raw stock wool is treated with 3% of bichromate of soda or potash at the boil for 1½ hours. After being washed, the wool is dyed with hematine paste or hematine crystals for an hour and a half. A variation of this sweet mordant is to use both the bichromate of soda and sulfuric acid. This last mordant is strongly oxidizing and generally strips all loose color from the wool. After being thorough washed, the wool is dyed with hematine. In the past this latter formula was usually employed in redyeing all other colors. It produced a very harsh feel to the wool, but it was a very cheap method and produced a fast black.

In the second method the mordant is generally made up with 3% of bichrome, 3% of half-refined tartar and 0.75% of bluestone. The mordanting operation usually takes 1½ hours and after being washed, the wool is dyed as before with hematine paste or hematine crystals. This mordant produces a very soft-feeling wool.

Both of the aforementioned methods require two separate baths and about four to five hours are required to complete the operation in each case.

Contemporary research has shown that

wool will not absorb more than 1.5% of bichromate of soda. If more than that is used, the excess has to be rinsed out before dyeing with hematine. The next problem is to reduce the bichromate to a basic chrome oxide as the hematine will not form a lake with the neutral chromate. Several organic acids, such as tartaric, lactic, oxalic, and hydroxyacetic acid, will produce the basic chrome oxide (Cr_2O_3). Such acids as formic, hydrochloric and sulfuric will act as "pushers" to force the bichromate out of solution and hold it onto the wool. Therefore, after all the bichromate is reduced and exhausted and taken up by the wool, there is no necessity to drop the mordant bath, and the dyeing with previously dissolved hematine can be carried out in the same bath after the mordanting operation is complete.

The usual procedure for the one-bath operation is to start with 1.5% of bichromate of soda and 6% of the mordanting acids, boil for 1½ hours, then add the previously dissolved hematine crystals (10%) to the same mordanting bath, bring the temperature back to the boil and run for 1-1½ hours to reach the desired depth of shade. Soluble oils may be added to the bath at the end of the operation to facilitate the later carding and winding operations. To insure the best fastness to carbonizing and cross dyeing, the dyed wool can be aftertreated at the boil for 20 minutes with a small amount of bichrome (½%) and sulfuric acid (½%). This operation is sure to oxidize any small amount of hematine that may be left in the wool after dyeing. Wool so dyed will stand a 100-hour Fade-Ometer test, severe fulling and decatizing.

C) COTTON——Both cotton raw stock and cotton piece goods continue to be dyed with unoxidized logwood extract.

The raw stock is best dyed in a two-compartment washer using a 5 to 10% solution of logwood extract with soda ash and bluestone. A second wool washer is used in series for washing. After running through squeeze rollers, the stock is allowed to smother as long as convenient and is then blown up to the dryers.

Cotton piece goods are best dyed in a padder. A large box padder is charged with 5 to 7% solution of logwood extract kept at a boiling temperature. Since the cloth is dry at the start, it will pick up dye solution which has to be restored from a reserve stock solution fed into the padding machine. The cloth passes through the logwood padder and direct to a box holding a solution of black iron liquor (pyroligmite of iron) standing at about 8-10° Tw. After coming from the iron liquor it is folded into deep boxes by an overhead swinging rack. The filled boxes are moved ahead and empty ones take their place. The cloth is allowed to smother for 6 to 10 hours after which time the cloth is fed into a multibowl washer. From there is goes to drying cans. A finishing paste and dryer completes the run. This method of dyeing gives tremendous yardage——50 to 100 yards per minute.

Another method is used for better grades of cotton cloth which are dyed in the jig. In this case the cloth is run into the jig containing logwood solution and then dried on cans. It is subsequently treated in a bichromate of soda solution to develop the black and after a warm wash is dried on the cans again.

A third method is used in the British Isles. The cloth is first passed through a tannin solution, such as myrabolam extract, and after smothering is passed through a pyrolignite of iron solution to fix the tannin. Then follows a hot lime solution, which produces a still faster lake and also absorbs the odor of the pyrolignite of iron. After being washed the cloth is dyed with hematine crystals. This process takes considerable time but produces a very fast black.

It should be remembered that logwood-dyed material always picks up additional weight. The increase in weight is on the order of 5 to 7% for cotton 5% for wool.

D) LEATHER——The dyewood extracts are used extensively on leather. They are generally used on chrome-tanned leather as vegetable-tanned leather has little or no affinity for the natural dyewoods. The reason for this is that the hide's affinity for tannin substance is eliminated by the vegetable-tannin process. The leather industry constitutes the largest group of buyers of the natural dyewoods. While silk will use 18-30% of logwood and cotton, 10-15%, leather requires only 3-6% of liquid logwood extract or 1.5-3% of logwood crystals. The use of dyewoods on chrome-tanned leather imparts a certain quality to the leather which apparently cannot be obtained by the synthetic dyes. While the aniline dyes are used only for the color they contain, the dyewoods are used not only for their color but for the slight retanning effect on the leather. The dyewoods have good penetrating power and help the aniline dyes, which are used in conjunction with them.

The tanner must be careful about the amount of dyewood he uses. The proper amount depends not only upon the depth of shade required but the nature of the skins to be colored. Soft, open-grain skins, such as those of the sheep and calf, can take more than the tight-grained goat skin.

To color, the skins are generally drummed with the requisite amount of dyewoods, i e, logwood-hematine fustic, hypernic, osage orange, etc, and 1/16% of soda ash at temperatures of 100 to 110°F. They are then struck or fixed with 1/16% of bluestone and ⅛% of copperas and later fat-liquored. With the dyewoods acid colors can be added directly to the drum to get exact matches to any sample shade. Basic colors must be added in a separate bath as they would be thrown out of solution otherwise by the dyewood colors or the acid colors.

E) NYLON——The dyewoods have been used on nylon for 8 to 10 years.

Initially it was assumed that nylon might be dyed with logwood using the formulas which had been used on silk or wool. However, the formula for silk was decidedly not suitable, nor could the one-bath formula for wool be used as the nylon would not absorb much chrome.

After many trials, it was found that a mordant of bichromate of soda and sulfuric acid (one percent of each) is effective in producing a deep blue black in nylon with an oxidized logwood.

It was also found that the fiber can be dyed by first treating it in a strong solution of unoxidized logwood (0.8-1.0%) for one hour near the boil with a small amount of acetic acid. This produced a light tan shade. It is rinsed in cold water as logwood is quite insoluble in this medium. The black color is then developed in a solution of bichromate of soda (0.5 to 2%) just under the boil for ¾ of an hour. The stock is finally rinsed in hot water to remove any trace of chrome.

Nylon may be dyed by either of the above methods using logwood-hematine — fustic, hypernic or osage orange extracts either alone or in combination. A combination of 90 parts of fustic and 10 parts of logwood produces a beautiful shade of olive green.

The fact that nylon can be dyed with the natural dyewoods is important, but a more significant thing is that natural dyewoods preserve the strength of the nylon much more effectively than do the aniline dyes.

F) ACETATE RAYON——Acetate rayon may be dyed with logwood by first running it in a strong, hot solution of logwood extract made acid with acetic acid, rinsing in cold water, and developing the black color in a solution of bichromate of soda made acid with acetic acid. In actual practice, this method works best with acetate piece goods dyed on a jig. The concentration of dyebath is regulated by the dye ratio. We have obtained best results with a special logwood product manufactured in England by the Yorkshire Dyeware Co, and marketed under the name "Hemasol AR Paste". Excellent results have been obtained with good penetration, a light fastness of forty hours, plus good fastness

(Concluded on page 164)

ABSTRACTS

Symposium on Textile Printing

J Soc Dyers Colourists 69, #13, 529-687, December, 1953.

THE PRODUCTION OF PRINTING ROLLERS BY ELECTRODEPOSITION

E A Ollard, p 529-36.

A printing roller is normally produced from copper, and it is essential that the metal should be homogeneous and free from pores, inclusions, or other imperfections which would cause difficulty in etching. Also, the roller is likely to be used a number of times, which means that it must be capable of being built up after use to its original diameter. The surface must be extremely smooth and highly polished, and the metal must be capable of withstanding a certain amount of pressure without distortion.

The most convenient way of producing a suitable roller to fulfill these conditions is by electrodeposition. Normally a steel tube is used as the base of the roller, and this is mounted on suitable end plates on a spindle. The whole is then copper-plated, a thick deposit of copper of suitable mechanical properties being produced on the outer diameter. This is then turned to the required size and polished, after which the design is etched on it. The roller may then be used directly, or, if it is required for a long run, it may be faced with a hard metal, such as chromium.

The process and the plant for depositing copper on printing rollers are described in detail, and also the process for facing rollers with chromium.

THE PRODUCTION OF PICTORIAL EFFECTS IN TEXTILE PRINTING

N W Yelland, p 538-48.

As occasionally required, photographs, pictures, etc., could be reproduced by printing on textiles in color or monochrome, if means could be found to engrave intaglio rollers so that they would print precisely the required graduated density of color at each point of the surface. Experiments are described which were made to ascertain what color-tones are produced by various strengths of engraving of two possible types — (a) intaglio half-tone (graduated cell-area) and (b) photogravure (graduated depth of etching). Tone values were obtained by calculation from reflectometer measurements on the prints.

Photogravure grounds could give smoother quality of tone, being potentially less subject to producing thread-moire effects than is half-tone, but they are less easy to control in practice. Means are described for making intaglio half-tone dot positive films to produce the required tone-rendering with any given combination of cloth and printing color. The apparatus employs for half-tone conversion a form of half-tone screen in which every aperture is a microscopic lens, in combination with a light source which is regulated to control the radial distribution of light in the half-tone dots.

Images in monochrome and in three colors can also be produced on cloth by direct photography from suitable sets of negatives or diapositives.

MELANGE OR VIGOUREUX PRINTING

F Buxtorf and A Wiazmitinow, p 550-4.

The Vigoureux process consists broadly of printing a wide web of slubbing with diagonal or lateral stripes of color, a proportion of the slubbing being left unprinted, so that during subsequent gilling and combing a uniform yarn and finally a uniform colored-and-white fabric is produced. The overall depth of color of the final fabric is determined by the area of the slubbing web that is actually covered or printed.

The authors describe the equipment and methods used in printing wool, rayon staple, and polyamide fibers. Illustrations and diagrams of the various machines are shown, together with typical roller engravings, and a number of printing recipes are included.

THE PRODUCTION OF METAL SCREENS

G Waller, p 557-9.

Hitherto the universal practice in screen-making has been to start with a woven fabric, usually of silk or other textile fiber, less commonly of bronze metal, and fill in the interstices with lacquer in the parts which are not required to print. The portions of the screen remaining in the open woven state form the printed pattern.

A new method of producing screens is described. By taking as the starting point a thin sheet of metal such as copper, and etching through in an appropriate pattern, a screen is produced which is not only more resistant to print colors but in which much greater control is possible over the form of the basic mesh.

In principle the screen is made by a similar method to that by which line and half-tone process blocks are made for letterpress printing, except that, by using thin sheet metal and prolonging the etching, the pattern is etched through to the back of the plate.

Although the method requires a higher degree of technical skill and additional capital outlay compared with normal methods, improved results are said to be obtainable in the life and accuracy of registration of screens.

DOCTOR STREAKS——THEIR ORIGIN AND PREVENTION

E A Krähenbühl, p 561-5.

Based upon the theory that excessive friction between doctor blade and roller surface is the primary cause of roller damage, and can provoke this trouble even in print pastes containing no trace of solid matter, the author reports on trials with a printing assembly linked with a friction-measuring device. The entirely different behavior of some thickenings with high and others with low dry content gives evidence of their varying working properties.

It is shown that the use of thickenings with high dry content, addition of lubricants to print pastes containing low-dry content thickenings, and especially replacement of copper rollers by chromium-plated ones, will in most cases eliminate the causes of roller damage. There is, however, an indication that changes of pH may completely alter the friction characteristics of thickenings, and that with more and more ingredients present in the print pastes their performance becomes increasingly unpredictable and requires closer investigation.

THE FLOW PROPERTIES OF TEXTILE PRINTING PASTES

R L Derry and R S Higginbotham, p 569-73.

The color pastes employed in the machine printing of textiles are rheologically complex fluids, the viscosity coefficient falling with increase in rate of shear or shearing stress. In order to relate the viscosity of a paste with the quality of the resulting print, it is essential that the measurements of apparent viscosity should be made at the operative shearing stresses.

Sharpness of definition is shown to be controlled by the viscosity of the printing paste at a shearing stress of 4500 dynes/sq cm, and levelness by the viscosity at low stresses of the order of 100 dynes/sq cm.

Viscosity ranges suitable for the print-

ing of fine lines, pegs, and blotches are indicated. The amount of anomaly which can be tolerated in pastes intended for the printing of fine lines is greater than in those intended for the printing of pegs and blotches, where the conflicting requirements of levelness and definition have to be satisfied.

RHEOLOGY AND THE LETTERPRESS PRINTING PROCESS

N Casson, p 576-81.

There are two main reasons why rheology has not been extensively applied to letterpress printing. First, the rheological character of inks is abnormal, and consequently difficult to define precisely; second, the mechanism of the passage of the ink through the press is imperfectly understood, and the magnitudes of the various forces, etc, involved are known only very approximately. Consequently a general discussion of these two topics constitutes the main content of this paper.

Since most printing inks do not obey the Newtonian flow equation, their rheological properties cannot be characterized by a single coefficient of viscosity. However, in the majority of printing inks the shearing stress-rate of shear relation becomes linear at high rates of shear, allowing the flow curve to be defined by two quantities, viz, U, the "plastic viscosity" and f, the "yield value". The validity and the usefulness of this procedure are discussed. The effects of the U and f values of an ink on its printing performance are considered in outline.

THE REDUCTION OF VAT DYES IN PRINTING PASTES

W J Marshall and R H Peters, p 583-93

The relation between the reduction properties of vat dyes measured under conditions akin to practice and their printing properties has been examined. Leuco potentials have been determined from electrometric titrations in aqueous solutions, and they have been found to govern the sensitivity of the dyes to the Formosul (sodium formaldehyde sulfoxylate) concentration.

Complementary to these measurements are those in which the reducing strengths of the pastes have been determined from the potentials developed at a platinum electrode. These results have been related to the leuco potentials of the dyes, and it has been shown that the maximum potentials reached are adequate to reduce all the dyes. Their duration, however, is short for the low concentrations of Formosul and long for the high concentrations. This is due to decomposition of the reducing agent in the presence of gum, and some decomposition rates are given.

The rates of reduction have been measured in print pastes using a model steamer. The times required for complete reduction cover a wide range, but for most dyes they are a substantial proportion of the time allowed for steaming, and must be considered when the printing efficiency of a dye is assessed.

Finally, provided the dye is completely reduced, the maximum fixation is determined by its affinity; rates of diffusion in the fiber, solubility of the leuco dye in the paste, and acid leuco formation do not appear to be important.

AN INVESTIGATION OF THE CHEMICAL REACTIONS INVOLVED IN THE USE OF SODIUM FORMALDEHYDE-SULFOXYLATE IN TEXTILE PRINTING

R J Hannay and W Furness, p 596-602.

In discharge printing with sodium formaldehyde-sulfoxylate, reduction of the dye is accompanied by oxidation of the formaldehyde-sulfoxylate to formaldehyde-bisulfite. Although some preliminary decomposition has been noted during drying of the cloth immediately after printing, the main object of this investigation was to determine the extent, and to trace the products, of decomposition of the formaldehyde-sulfoxylate during the steaming of a printed and dried filament viscose-rayon crepe.

Methods of analysis are described. Their use has shown that the extent of decomposition on steaming depends very much on other constituents of the printing paste. In particular, the influence of added sodium carbonate and sodium sulfite in pastes made up with British gum and gum tragacanth has been traced, and the effect of leaving printed goods overnight in warm storage before steaming has also been investigated.

Fluidity tests showed that no appreciable tendering of the crepe occurred under any of the conditions imposed in this investigation.

Possible causes of tendering of printed viscose fabrics were brought out by the authors and in the discussion following presentation of the paper.

THIOUREA DIOXIDE (FORMAMIDINESULFINIC ACID): A NEW REDUCING AGENT FOR TEXTILE PRINTING

P Krug, p 606-10.

Thiourea dioxide, an oxidation product of thiourea, is a reducing agent which is stable both in solid form and in cold aqueous solution. It has a slight acidic reaction, and acquires full reducing power only when heated in aqueous solution to about 100°C. This paper briefly describes the chemistry of thiourea dioxide, and deals with it as a reducing agent for vat dyes in the direct and discharge printing of cellulose acetate, silk, and wool. Owing to its acidic properties, these fibers can be printed with a minimum of degradation and great safety of production. The new reducing agent has been tried on a practical scale, and results of trials are demonstrated.

FAST-TO-LIGHT BASIC PRINTS ON VISCOSE RAYON

W S Miller, p 612-17.

In the past the brightest prints on viscose rayon have been obtained with acid and direct dyes, but these lack washing fastness, and many of the brightest acid dyes are also fugitive to light. The author shows how basic dyes, hitherto notoriously fugitive to light, may be printed by a new method, resulting in the deposition within the fibers of color lakes of molydophosphoric acid. A number of stages in the development of this new printing technique are described, and are related to the earlier development of the manufacture of similar lakes in pigment form. The new prints are fast to light and washing, and may be supplemented where necessary by use of insoluble azo dyes applied by suitable methods.

CONTROL OF PADDING PROCESSES BY RADIOACTIVE ISOTOPE LABELLING

H B Hampson and E W Jones, p 620-6.

Radioactive materials produced by neutron irradiation in an atomic pile have been available in Great Britain since 1947. They have found applications in many brances of research, in therapy, and in industrial control. This paper deals with their properties, and indicates how they may possibly be exploited in textile printing and other processes.

Experiments show that radio-isotope techniques may conveniently be employed to control the regularity of padded cloth, both across its width and throughout its length, by adding the radioactive material to the padding solution, and measuring the radiation on the cloth by means of a Geiger counter. Variations in absorbency of viscose staple fabrics are clearly indicated by the instrument. The method can also be valuable for the control of synthetic-resin impregnations.

THE PRINTING EFFICIENCY OF VAT DYES

A G H Michie and R Thornton, p 629-45.

A method of assessing vat-dye prints has been established, involving determination of the amount of dye applied to a cotton fabric by a roller printing technique, and the amount fixed at various stages during the after-printing processes. By extracting the vat dye from the fabric and determining optically the amount present in a given area it is possible to calculate the percentage dye fixation under a variety of conditions.

This method of assessment was used

initially to study a range of 17 vat dyes, applied by the potassium carbonate-Formosul process under conditions of varying Formosul concentration in the print paste, varying steaming times, and varying depths of shade. Later the effect of using different alkalis at various concentrations was studied, and also the effect of the addition of glycerol and of different thickening agents.

The predominant feature which emerged was the marked difference between the dyes in sensitivity to the Formosul concentration in the print paste. It is apparent that the instability of Formosul gives rise to the bulk of troubles experienced in printing vat dyes, since, provided the required amount of Formosul was added to the print paste, and remained on the print up to the time of steaming, *all* vat dyes could be satisfactorily printed.

Varying the thickening agent did not affect the amount of print paste applied to the fabric or the percentage dye fixation, though marked visual differences were apparent. Caustic soda was shown to be a more efficient alkali than potassium or sodium carbonate, giving both increased percentage fixation and increased rate of fixation. The addition of glycerol had the greatest effect when the steaming times were short.

A preliminary study of the pad-steam process showed a general decrease in the sensitivity of the dyes to the amount of Formosul present on the prints. The basic underlining principles were the same, however, since the order of "printability" was the same for both the pad-steam and the potassium carbonate-Formosul process.

DYE TRANSFER IN DYEING AND PRINTING

G D Myers and H A Turner, p 648-59.

The steaming process in textile printing has two major functions, the relative importance of which may vary from one printing style to another. They are—(a) to provide favorable conditions for the transfer of a dye or a dye-generating substance (including dyes which have undergone a reversible chemical change, principally to render them water-soluble) to the fiber-substance from the printing paste applied from the roller, screen, or block; (b) to bring about reactions which will transform a normally non-diffusible dye into a diffusible form (e g, in most styles for the printing of vat dyes), or which will convert a diffusible into a non-diffusible form, once the transfer has been accomplished (e g, in many mordant styles).

The results obtained in the study of dye transfer from thickener to fiber-substance, during steaming, for a number of different classes of dyes, have been compared with the results of parallel work on dyeing, in order to demonstrate the essential similarity of the two methods of coloration.

DEVELOPMENTS IN THE APPLICATION OF AZOIC DYES IN PRINTING

B Jomain, p 661-5.

Today the insoluble azoic dyes offer an important range of bright shades, possessing excellent general fastness and characterized by ease of application. A brief review is made of the development of azoic dyes for printing, from the original application of beta-naphthol prepares, via the Rapid Fast and Rapidogen ranges, to the recently introduced netural-steaming dyes (Neutrogenes). The application of these new dyes in multicolor styles is discussed in some detail.

Throughout this brief survey it can be seen that the tendency has been towards the production of a range of azoic dyes, of easy application, developed simply by neutral steaming, which will permit their association with other classes of dyes, particularly vat dyes.

RESISTS UNDER AZOIC DYES

J Frei, p 667-9.

The author traces the evolution of resist printing, beginning with the use of tin crystals for resisting basic dyes, Para red, etc. He states that the introduction of Variamine Blue has given a new impetus to resist printing. The most usual methods of application — resists by the lead chromate and aluminum chlorate processes — are described, and new possibilities are indicated of producing resists under red, orange, scarlet, and bordeaux diazo components.

NEW DEVELOPMENTS IN THE APPLICATION OF PHTHALOCYANINES IN TEXTILE PRINTING

F Gund, p 671-81.

A completely new method of using phthalocyanines in textile printing was introduced by the discovery of the Phthalogens, from which the Phthalocyanine pigment may be produced in the fiber. Special methods of application were developed and are described, which are characterized by the use of 10-20 per cent of special solvent mixtures, the Levasols, in the aqueous printing pastes containing the Phthalogen dye and a metal, the latter in the form of a soluble salt or as a complex compound (Phthalogen K).

The printing method is adapted to the usual processes and apparatus used in textile printing. Particular attention must be paid to the drying of the prints. Condensation to the pigment dye is best carried out by steaming.

Two new products, Phthalogen Brilliant Blue IF3G and Brilliant Green IFFB, are described; also a process for the production of white and colored resists under the Blue, the resisting agent being an organic base (Phthalotrop B).

OBSERVATIONS ON TEXTILE PRINTING IN THE U S A

O Habel, p 683-5.

Textile printing in the U. S. is discussed with particular emphasis on the more recent developments. The paper deals in the main with machine and screen printing, but passing reference is made to hand block and spray printing. The Aridye pigment process is described, and the production of photographic images on sensitized fabrics, using leuco vat esters. The "flash method" employed by screen printers, in which the vat dye is printed as a pigment, and attempts to mechanize the screen printing operations, are also discussed.—WHC

The Advantages and Uses of "Coloray" Spun Dyed Rayon Staple

R S Greenwood, *Papers Am Assoc Textile Technol* 9, 34-8, December, 1953.

The Techniques of Using "Coloray"

G V Lund, *ibid*, 39-42.

The Fastness Properties of "Coloray"

C P Tattersfield, *ibid*, 43-6.

This is a series of three papers by Courtaulds technicians.

Mr Greenwood describes the advantages obtained by the use of spun-dyed fibers, not only in solid shades but in blends with cotton, wool and the synthetic fibers. He lists a number of uses which have already been established for "Coloray".

Mr Lund enumerates the 13 colors at present available, including black. He discusses the physical techniques of using "Coloray" in the mill, with particular emphasis on the techniques of making color blends.

Mr Tattersfield gives details of the fastness of "Coloray" to laundering, light, perspiration, drycleaning, crocking, and sea water, and also to cross-dyeing of the other fibers with which it may be blended. Regarding costs, he finds that coloration with "Coloray" is always cheaper than with vat-dyed viscose rayon staple.—WHC

• PATENT DIGEST •

PAUL WENGRAF

FLAMEPROOFING COMPOSITION——— Precipitated Antimony Salt G, 2, 03

U S Pat 2,634,218 (Federal Leather Co——C B White——April 7, 1953)

A flame-resistant textile material may be obtained by impregnating with a solution of antimony trifluoride combined with a "peptizing" salt, such as sodium-, potassium- or ammonium fluoride, and treating after drying with sodium carbonate to precipitate antimony trioxide within the fibers. The peptizing salt is added to suppress dissociation of antimony trifluoride and to prevent premature hydrolysis and oxide formation which induces gelling of the preparation. "De Haen Salt" . . . $SbF_3 . (NH_4)_2SO_4$ . . . may also serve as a peptizing agent.

Textiles prepared according to this process are flameproof but not glowproof. Some of the known glowproofing agents, eg, chlorinated paraffins, tricresylphosphate and the like, might be added.

The essential part of this invention obviously is the use of peptizing salts to improve the stability of the solutions.

Among the references cited by the Patent Office:

U S Pat 2,416,447 (Du Pont/1947) describes a paper-flameproofing process, comprising admixture of Sb_2O_3 and other ingredients to the paper mass. A two-step precipitation process (such as that provided in the current patent) cannot be applied to paper because of inadequate absorption.

U S Pat 2,200,478 (I G Farben/1940): manufacture of antimony trioxide pigments by precipitation of the trifluoride with an alkaline compound.

Reference is also made to flameproofing methods which use double decomposition of antimony salts, eg, U S Pat 2,427,997 (White) [cf *Am Dyestuff Reptr* 36, 720 (1947)], or precipitating antimoniates with acids, eg, Brit P 579,328 (Jordan & O'Neill) [cf *Am Dyestuff Reptr* 36, 280 (1947)].

PIGMENT-PRINTING EMULSION———Special Polyesters as Pigment Binders D, 2, 07

U S Pat 2,637,621 (Auer——May 5, 1953)

In dyeing as well as printing, the usual drawbacks resulting from curing temperatures that have been too low are poor crock fastness and poor fixation.

The new resin binder described in this patent is said to be superior to similar compositions in that crocking is substantially eliminated, while setting of the resins results at relatively low temperatures. These esters, the essential part of the invention, are termed "E-Polyester Binders". They are prepared from a) reaction products of bisphenols, e g, dihydroxy diphenyl dimethyl methane with epichlorohydrine and b) higher fatty acids (preferably linseed oil fatty acids), which can be partly substituted by rosin acids. Many types of emulsifiers are enumerated for preparing water-in-oil-emulsions for the "E-Polyester Binders". Under specific conditions of preparing the ester condensate thermosetting occurs at temperatures not exceeding 220° F. The use of discharge prints and oil-in-water pigment emulsions (mostly for padding) in conjunction with the esters mentioned above is within the scope of this patent.

Among the references cited by the Patent Office:

U S Pat 2,342,642 (Interchemical Corporation/1944): coloring textiles with emulsions of pigmented lacquers in water, using, for instance, alkyd resins as binders. The net weight of the emulsion is not in excess of the fabric's weight.

U S Pat 2,383,937 (Am Cyanamid/1945): water-in-oil type emulsions for printing purposes are blended with a (chloroprene-) latex to cause sufficient flow of pastes used, e g, for blotch printing, without impairing the sharpness of the outlines.

U S Pat 2,444,333 (De Trey Freres/1948): thermosetting resins having quick hardening properties are obtained from bivalent phenols and ethylene oxide derivatives, such as diphenylolpropane and epichlorohydrin.

DYEING PROTEIN FIBERS ———Alkylating Pretreatment C, 4, 06

Brit P 692,924 (Wolsey Ltd——Alexander, Carter, Ford——June 17, 1953)

This specification pertains to the dyeing of various natural, synthetic or regenerated protein fibers which have been modified according to methods covered by other patent applications of the above inventors, e g, Brit P 692,478.

It has been observed that this class of fibers acquires affinity to acid dyes at pH 3-9. Thus fastness may be improved by pretreating the material with nontertiary lower alcohols (not over 4 C) in the presence of an acid catalyst, e g, hydrochloric acid, sulfuric acid or an acid-developing substance, such as boron trichloride or sodium hydrosulfate. Accordingly, combinations of treated and nontreated threads give two-tone effects.

The reaction between protein fiber and alcohol (as an alkalating agent) is slow at room temperature; it is therefore necessary to carry out the treatment at elevated temperatures not exceeding 120° C, optionally under pressure. Presence of water should be avoided in this reaction, which is limited to a moisture content of 25% and preferably, of 5%. The content of varying acid catalysts should be within the limits of N/10 to N/50 acid. Stronger concentrations, e g, N/5, are found to damage the fibers. The effect is reversed by an alkaline aftertreatment, especially when lower alcohols are used, while butanol or ethylene glycol, for instance, bring about more resistant changes of the fiber's substance. Isopropanol is found to be less effective than ethylene glycol, n-propanol or n-butanol.

Example: a hank of wool is immersed for 30 minutes in boiling methanol containing a certain amount of hydrochloric acid. After being squeezed and rinsed the hank is dyed with Azogeranine B in a conventional acid dyebath. The same dyestuff applied in *neutral solution* dyes the pretreated hank while nonpretreated material remains practically undyed. The dyed fibers prove to be fast to washing when scoured for 2 hours at 74° C in a ½% of soap solution.

Reference is made to U S Pats 2,131,145-6 (I G Farben-Schlack), which describe the conversion products of any kind of "formed proteins" (i e, wool, silk, regenerated protein fibers, etc) when treated with alkylene oxide, epichlorohydrin or similar agents. Such treatment is said to result in increased affinity to acid dyes in neutral or alkaline dye liquids.

In an analogous way French Pat 800,570 and Brit Pat 469,457 refer to reaction products with epichlorohydrin or ethylene oxide. An alkylating reaction must be assumed. It could not be predicted that lower alcohols plus acid catalysts will react with the protein substance under the conditions mentioned above.

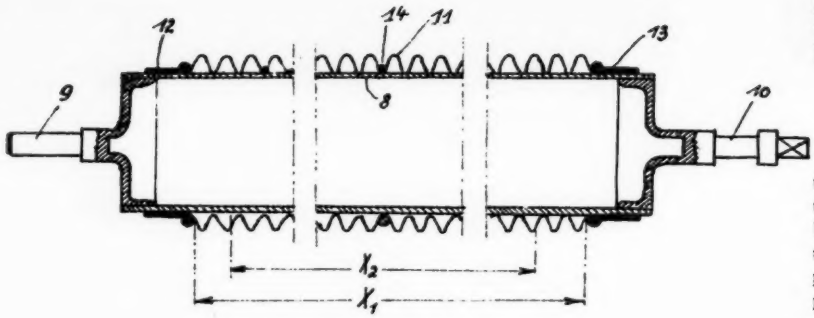


Figure 1
B P 695.041

ROLLER PRINTING MACHINE ——Transfer Rollers of Variable Width D, 3

Brit P 695,041
(Schlieper & Baum——Aug 5, 1953)

It is unfortunate that a good portion of any printing paste is wasted in partly soiling the rubber cloth and the greys in portions not covered by the print rollers. Moreover, these two sheets must constantly be cleaned in the printing process.

It is obviously desirable to convey only as much of the printing ink to the engraved roller as is needed for the actual printing process, thus avoiding any spilling of the printing paste onto the adjacent outside portions of the rubber cloth or the grey.

According to the present invention, this problem may be solved by providing transfer rollers, covered with a "concertina-like rubber sleeve", which can be compressed or expanded at will to a width corresponding to that of the engraved part of the printing roller. Referring to Figure 1, the rubber-covered transfer roller comprises a smooth, metallic cylinder (8) provided with a rubber sleeve (11), displaceable on cylinder (8). Sealing rims (12 and 13), fixed on the cylinder, can be adjusted according to the width of the printing roller. Thus the rubber sleeve actually forms the surface of the transfer roller. It is preferable to fix the middle of the sleeve to the cylinder (8) by a strong rubber ring (14) or by other appropriate means.

PIGMENT PRINTS——Fixed with Polyisocyanate Derivatives D, 2, 07

Brit P 694,076
(Badische Anilin- & Soda Fabrik——July 15, 1953)

The high-molecular substances used in this pigment-printing process are characterized by hydroxy-, carboxylic- or carboxylic acid amide groups. Examples of these components are cellulose derivatives, polyamides, polyurethanes, polyesters, polyacrylic acid amides, and so on. They are used in preparing pigmented solutions, for instance, with phthalocyanines, insoluble azodyes or mineral dye pigments.

Combinations of this kind printed on fabrics and reacted before, during or after the printing (or dyeing) procedure with substances converted either by heating into polyisocyanates or splitting off free polyisocyanates were found to produce prints (or dyeings) of very good fastness to washing and crocking.

Example: a finely divided copper phthalocyanine blended with the adduct of sodium bisulfite and methylene diisocyanate is stirred into water containing the condensate of heptyl- and hexylnaphthol with ethylene oxide. The resulting paste is vigorously stirred with a starch tragacanth thickener and a concentrated solution of an ethyl acrylate-acrylic acid copolymer. Cotton fabric is printed with this paste and heated to 140° C. The prints are found to be sharp and highly resistant to washing and rubbing.

Natural Dyewoods——

(Concluded from page 159)

to acid and alkaline perspiration.

Standard batches of 1500 yards of 100% acetate may be dyed with 45 pounds of Hemasol AR Paste and with 25 pounds of bichromate of soda in the developing bath. Total time of dyeing is about four to six hours and is thus quicker than a developed black, which requires three separate baths with two washes in between. Practically the same formula may be used for dyeing 100% nylon piece goods.

If acetate fiber is blended with viscose rayon, the rayon may be dyed with a direct black used in the Hemasol AR Paste bath and exhausted with anhydrous sodium sulfate.

G) WOOD——Dominoes, checkers, bottle tops and stag horn for knife handles may be dyed by first treating in a boiling-hot solution of logwood extract and then developing the black lake by placing in a solution of copperas or iron sulfate. They are dyed in open tubs and the penetration is sufficient to stand any subsequent embossing.

If perfect penetration is required, the logwood solution is used in a closed-vacuum autoclave. In this case the black color is developed in a weak solution of pyrolignite of iron solution.

H) HOG BRISTLES, CATTLE HAIR AND HORSE HAIR——Hog bristles are dyed in varying lengths depending on their ultimate end use, e g, paint brushes.

There are many types of hog bristles. Some come from Chinese, Manchurian, Japanese and European sources, although most of the China bristles have disappeared from the market since the government bought up those available some time ago and allocated them to different manufacturers.

Methods and techniques in dyeing hog bristles differ, but the basic formula, an acidified logwood bath followed by an acidified bichromate of potash bath, remains.

It is interesting to note that paint brushes made with hog bristles seem to absorb and hold the paint better than those made from some of the synthetic fibers.

Cattle hair and horse tail and mane hair are also dyed black with logwood. These are generally dyed in large open vats with logwood and bluestone after which copperas is added directly to the bath to complete the lake formation. The presence of the bluestone-copper sulfate renders the hair immune from mildew. Hair so dyed is much used extensively for mattresses.

I) FURS——The most expensive furs, such as caracul, Persian lamb and Alaskan seal skins, are all dyed with logwood. The process is quite lengthy.

J) LAKES AND PIGMENTS——All three of the principal natural dyewoods (logwood, hypernic and quercitron bark extract) are used as the base for making lakes and pigments. Formerly these lakes were used in great volume by the wallpaper industry, but the demand has fallen off with the introduction of lightproof pigments.

K) RUSTPROOFING——Since iron rust in the form of iron oxide will combine with logwood to make a blue-to-black lake, gun barrels, hammer heads, steel plates, etc, may be so treated.

Proceedings of the
American Association of Textile Chemists and Colorists

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Editor of Proceedings: Carl Z Draves, 30 Lahey St, New Hyde Park, N Y

MARCH 15, 1954

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PLANS for the 33rd National Convention and the South's first textile wet processing exhibit were discussed at the first meeting of the committees preparing for the event, which will be held September 15-18 at the Atlanta Biltmore, Atlanta, Georgia, under the sponsorship of the Southern Region. Those in attendance included members of the Executive Committee, the Regional Advisory Committee, and others.

Seated (l to r): **A Kempton Hughes, Rohm & Haas Co, Inc, REGISTRATION; T Howard McCamy, Pepperell Mfg Co, SOUTHEASTERN SECTION ADVISORY COMMITTEE: Paul G Wear, Penick & Ford, Ltd, Inc, ASSISTANT CHAIRMAN; C Russell Gill, Southern Sizing Co, GENERAL CHAIRMAN; Paul O Anderson, Peerless Woolen Mills, SOUTH CENTRAL SECTION ADVISORY COMMITTEE; James W Swiney, Fulton Bag & Cotton Mills, FINANCE; H Gillespie Smith, Organic Chemicals Div, American Cyanamid Co, RESERVATIONS; and Joe T Bohannon, Jr, American Aniline Products, Inc, DINING.**

Standing (l to r): **John K Boykin, National Aniline Div, Allied Chemical & Dye Corp; James L Taylor, Georgia Institute of Technology; Samuel L Hayes, Ciba Co, Inc; Wyss L Barker, National Aniline Div, Allied Chemical & Dye Corp, TRANSPORTATION; David Meriwether, Seydel-Woolley & Co; Junius M Smith, Clark Publishing Co, PRINTING; William B Griffin, Dexter Chemical Corp, LADIES; Max Ferguson; Francis S Webster, Jr, F H Ross & Co, Inc; John C Cook, W R Smith Publishing Co, EXHIBITS; Adam Fisher, Jr, Du Pont, RECEPTION; John O Sweitzer, Scholler Bros, Inc, ENTERTAINMENT; and Arthur R Thompson, Ciba Co, Inc, PUBLICITY.**

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COUNCIL

1954—Apr 30 (Atlantic City), June 15, Sept 15, Nov 19.
1955—Jan 21, Apr 15, June 17

NATIONAL CONVENTIONS

Sept 15-18, 1954 (Atlanta Biltmore, Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J; 1956 (New York); 1957 (Boston).

HUDSON-MOHAWK SECTION

April 9, May 14 (Albany); June 18 (Outing).

MID-WEST SECTION

April 10 (Netherlands Plaza, Cincinnati, O); June 11-13 (Annual Outing—Lake Lawn Lodge, Delavan, Wis).

NEW YORK SECTION

April 9, May 14 (Swiss Chalet); June 18 (Outing, North Jersey Country Club, Wayne, N J).

NORTHERN NEW ENGLAND SECTION

Apr 9 (Lowell Tech, Lowell, Mass); June 11 (Outing—Merrimack Valley C C, Methuen, Mass); Oct 8 (Colonial C C, Lynnfield, Mass); Dec 10 (Woodland Golf Club, Auburndale, Mass).

PIEDMONT SECTION

Apr 10 (Hotel Roanoke, Roanoke, Va); June 11-12 (Outing, Mayview Manor, Blowing Rock, N C); Oct 16 (Hotel Barringer, Charlotte, N C).

PHILADELPHIA SECTION

Apr 9 (Kugler's Restaurant, Philadelphia, Pa); May 21 (Outing—Manufacturers Golf & Country Club, Oreland, Pa); Sept 24, Oct 29 (Penn-Sherwood Hotel, Philadelphia, Pa); Dec 3 (Kugler's).

RHODE ISLAND SECTION

Mar 25 (Prov Eng Soc); Apr 29 (Wannamoisett Country Club, Rumford, R I); June 11 (Outing—Wannamoisett C C); Oct 14 (Johnson's); Dec 2 (Annual Meeting—Sheraton Biltmore, Providence, R I).

SOUTH CENTRAL SECTION

April 24 (Hotel Patten, Chattanooga, Tenn); June 4-5 (Summer Outing—Chattanooga Golf and Country Club); Dec 4 (Hotel Patten, Chattanooga).

SOUTHEASTERN SECTION

Mar 27 (Ralston Hotel, Columbus, Ga); May 14-15 (Outing—Radium Springs, Ga); Dec 11 (Atlanta-Biltmore, Atlanta, Ga).

WASHINGTON SECTION

April 9 (National Institute of Dry Cleaning, Silver Spring, Md).

WESTERN NEW ENGLAND SECTION

Mar 19 (Rapp's Restaurant, Shelton, Conn); May 14 (Ladies Night—Waverly Inn, Cheshire, Conn); June 18; Oct 1, Nov 12, Dec 10 (Rapp's).

EMPLOYMENT REGISTER

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54-3

Education: B S, textile chemistry & dyeing.

Experience: textile chemist, laboratory and plant.

Age: 24; single; references; technical work in dyeing, printing or finishing desired, New York or Philadelphia area preferred but not essential.

3-1, 3-15

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(Concluded on Page P171)

New York Section——

NEUTRAL PREMETALIZED DYESTUFFS*

CHARLES WEIDMANN

Technical Director, Ciba Co, Inc, New York, N Y

INTRODUCTION

THE introduction of neutral premetalized dyes represents a very important step forward in the field of dye-metal complexes. The enthusiastic acceptance of the new dye by the trade is proof that they offer the answer to problems the dyers and chemists have faced for years.

The use of dyestuffs with dye-metal complexes is not a new development in the dyeing industry. Historical records show that the practice of using metal salts as mordants for fixing dyes on vegetable and animal fibers was known in the earliest days of the dyeing art.

The presence of a so-called metalizable grouping in a dye molecule is the preliminary condition for the formation of a complex between dyestuff and heavy metal. A chemical group, such as ortho, orthoprime-dihydroxyazo, is a typical example, and the most important metals used in a dye-metal complex are chromium and copper. Aluminum, cobalt and iron have been found less suitable.

Our intention tonight is to study dyeing with the new neutral-dyeing premetalized dyes. However, in order to compare the position of this group clearly with other metal-complex dyes, it will be necessary to refer briefly to some of the elementary principles of dye chemistry.

CHEMISTRY OF METAL-COMPLEX FORMATION

The acid-dyeing premetalized colors, eg, most Neolan, Calcofast, Chromacyl, Palatine and similar dyestuffs, are referred to as "1:1 chromium-dye complexes". By this we mean that in this group the dye-metal complex is made up through the union of 1 molecule of dye with 1 atom of chromium. To make these compounds water-soluble, they have to contain at least one sulfonic acid group as the sodium salt. A substantive cationic complex is then formed only in a strongly acid medium because only two of the three positive chromium valences are saturated by the negative OH radicals (Figure 1). It is recognized that the 1:2 complexes, in which one chromium atom reacts with two molecules of dyestuff, are more easily formed than the 1:1 complex. The 1:2 complexes are present in mordant dyeings and are formed on wool by adding bichromate. Race, Rowe and Speakman *(1)* proved in their investigation of three mordant dyestuffs that these complexes are formed on the fiber in dyeing according to one of the usual chroming methods:

a) *Bottom-chrome* where the chromium is first placed in the fiber and the dye-chromium-fiber complex is built up during the dyeing operation.

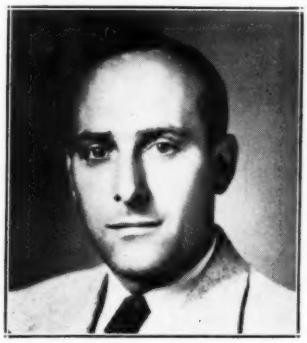
b) *After-chrome* where the dye is first positioned within the fiber and the dye-chromium complex is made in the after-chroming bath.

c) *Meta-chrome or synchromate process* where the dye-chromium complex is developed simultaneously with the dye absorption.

The chrome is generally used in the form of bichromate.

W Widmer *(2)* has compared the properties of the 1:1 complexes with those of the 1:2 complexes.

It is relatively easy to synthesize dyestuffs containing 1:2 complexes. However, they have the disadvantages of producing dyeings of poor levelness and unsatisfactory fastness on the fiber. Research has been carried out over a long period of time in an effort to solubilize the 1:2 complexes by using other groups to replace the strongly acid sulfonic groups.



C Weidmann

There are two types of premetalized dyestuffs, both of which contain metal (primarily chromium) in complex formation in the dye molecule involving primary and secondary valencies. Both these types are known for giving fast dyeings on wool, silk, and polyamide fibers. The older acid-dyeing type, exemplified by the Neolans, contains a sulfuric acid group and must be dyed with strong acid to get level results. The newer, neutral-dyeing types do not contain any acid group and are best applied from a nearly neutral bath.

The author points out just how these two classes differ in chemical composition, dyeing behavior, ease of application, preservation of fiber, and uses. It is especially interesting to note that a neutral-dyeing premetalized dye forms a combination with the fiber very analagous to that formed in the application of a simple chrome dyestuff, which is dyed along with, before or after a chroming of the fiber with bichromate.

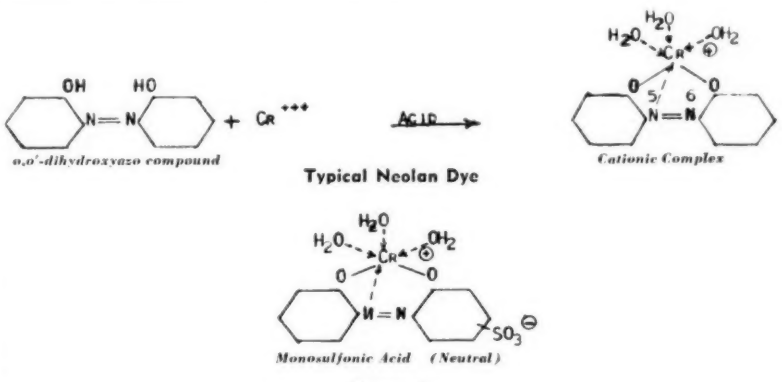
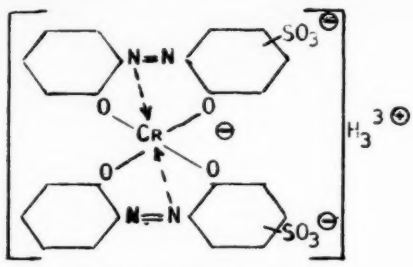


Figure 1

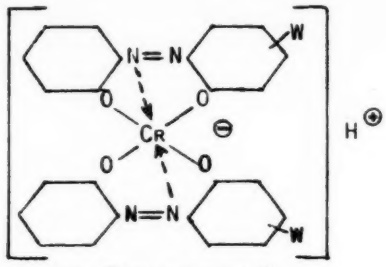
* Presented at the Hotel Statler, New York, N Y, on Jan 29, 1954. Corrected manuscript received by the Editor of Proceedings on Feb 5, 1954 and submitted to the Reporter on Feb 15, 1954.



ANIONIC COMPLEX WITH TWO SULFO GROUPS, THUS THREE-BASIC ACID CHARACTER

TYPE

CHROME MORDANT DYE



ANIONIC COMPLEX WITH W.. GROUPS IMPARTING WATER SOLUBILITY

TYPE

CIBALAN DYE

Figure 2
1:2 Chromium Dyestuff Complexes

Ciba patents granted in 1925 and 1928 cover the manufacture of water-soluble dyestuff-metal complexes, the dyestuff compound being an azo dye free from sulfonic acid groups. These brands did not give satisfactory results when dyed on wool according to the Neolan method because metal complexes containing 1 atom metal to 2 molecules of azo dye decompose in strongly acid baths and are fixed unevenly on the fiber. Although it had been observed at that time that metal complexes of this type dyed wool and silk from an acetic acid bath, these products were discontinued because neither the shades of the dyeings nor the fastness properties could be considered satisfactory.

Dye manufacturers have endeavored over the last ten years to bridge the gap in the series of synchromate dyes. Despite all the advantages of the synchromate method, it was the principal goal to develop ready-made, water-soluble metal-complex dyes in order to procure wool dyeings of superior fastness in a single operation excluding any chemical alteration of the fiber. In recent years great progress has been made in this line.

The neutral premetalized colors are water-soluble metal-complex dyes, bearing no sulfonic acid solubilizing radicals in the molecule. They may be compared chemically with the usual mordant colors, which are metalized on the fiber insofar as their metal content is concerned, since both of these groups contain 1 atom of metal to 2 molecules of nonmetalized dyes.

Figure 2 shows the 1:2 complex formed on the fiber in dyeing a chromium-mordant dye upon adding a chromium salt. Two molecules of an o, o'-dihydroxyazo dyestuff form an anionic complex with one chromium atom.

The constitution of the 1-chrome/2-dyestuff/keratin complex has not been exactly determined by experiments. However, we know that, because of its excellent fastness to water, it is very stable. The constitution of a neutral premetalized dye is shown schematically on the right hand side of Figure 2. The difference between the two dyestuffs shown is that the sulfo groups of the chrome dyestuff on the left have been replaced by other groups (W) which impart water solubility to the dye. The bonding of the two types of dyestuffs to the keratin groups of wool is probably also quite similar.

APPLICATION

As the dyestuff molecules absorbed by the fiber have slight migration properties because of the high stability of these linkages, it is imperative to adjust the pH and temperature in dyeing in such a way that a slow and even absorption of the dyestuff is obtained from the start of the dyeing. We would like to add that the degree of migration varies with the temperature, the dyestuff and the material. At a temperature below 180° F a substantial migration of the dyestuff is observed, but above this temperature the dyes show a lower degree of migration. At boiling temperature a certain development of the dyes is observed.

Because of the absence of sulfonic acid groups in these dyestuffs, there is no salt-type linkage between dyestuff and fiber, and the use of Glauber's salt as a leveling agent is not necessary or advisable.

As we have briefly mentioned before, the exhaustion rate and at the same time the leveling of these dyestuffs are controlled by three factors:

1) The acid concentration or pH of the dyebath.
2) The temperature.
3) The agitation of the bath.

The first factor is the most important.

It can be seen from Figure 3, where dyeings were made with a 2% solution of Cibalan Scarlet GL at pH values of 5.0, 6.5, and 8.0 respectively, that the speed of absorption decreased with an increase in pH. The result is that more dye is left in the liquor. This is a general rule for the whole group of the neutral premetalized dyestuffs. Measurements were taken on a Dyometer *(3)* connected with a Lumetron-Colorimeter.

Practice has proved that optimum results are obtained when dyeing is carried out at a pH around 6.5; the dyebath still retains 5-10% of the originally added dyestuff after ½ hour's boiling. Very similar absorption curves are obtained with all groups of neutral premetalized dyes, and it is the reason why, despite slight migration, even dyeings are obtained.

A simple method *(4)* has been developed which works very well in practice and indicates if dyeing has been carried out at the best pH condition. This method calls for diluting a small portion of the dyebath, after the dyeing has been run for 10 minutes at 120° F, at a ratio of 1 part dyebath solution to 9 parts water. This solution is used as a control for comparing it with the exhausted dye liquor after 15 minutes' boiling for light shades and 45 minutes' for dark shades. The comparative solution of the exhausted dyebath with the reference standard will show one of the following three results:

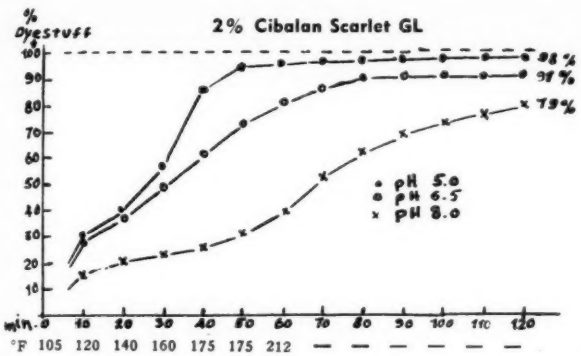


Figure 3

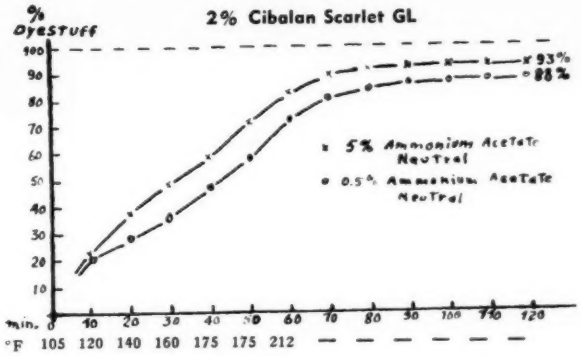

% DYESTUFF
2% Cibalan Scarlet GL
x 93%
o 88 %
x 5% Ammonium Acetate Neutral
o 0.5% Ammonium Acetate Neutral
min. 0 10 20 30 40 50 60 70 80 90 100 110 120
°F 105 120 140 160 175 175 212 — — — — — —

Figure 4

1) The dyebath solution is darker than the standard solution. This indicates that the pH is too high. This can be corrected by the addition of a small amount of diluted acetic acid. To make such an addition, it is necessary to shut off the steam while the addition is being made and then to bring the bath back to the boil for a further 15 minutes.
2) The dyebath looks like the standard solution. The pH is correct.
3) The dyebath is practically colorless. This indicates that the pH is too low. Nevertheless, the batch can be uniform, and for shading, the pH has to be increased by adding a little ammonium hydroxide.

This simple method has a drawback in that it gives evidence at the end of the operation only as to whether optimum conditions prevailed, but, on the other hand, mistakes in the following shading-off process can be avoided. Furthermore, it helps define the correct conditions for handling further batches, which can be be observed right from the beginning.

Because optimum dyeing takes place near the neutral point, the influence of water and scoured wool on dyeing cannot be overly emphasized. The following factors have to be considered:

1) Alkalinity of dyehouse water caused by the bicarbonates of calcium or magnesium or by passage through an ion-exchange process.
2) Alkalinity of wool caused by residual soda, soap and lime soap, which are firmly retained by wool in scouring.
3) Acid content of carbonized wool. It is very difficult to neutralize completely the residual acid in carbonized wool.

If the liquor is allowed to circulate for at least 15 minutes at 120° F, it may be assumed that a considerable degree of uniformity of pH has been achieved in the bath. It is unlikely, however, that complete uniformity will be obtained in the wool as wool does not readily release the alkali, and any sodium bicarbonate present will not be fully converted into soda after this period. The pH of a bath of this type is generally 8 or a little above. Generally it will be necessary to bring the pH to about 6.5 in order to ensure sufficient exhaustion. This is why the addition of an acid salt or a buffering compound is required. Ammonium acetate and ammonium sulfate have proved particularly suitable for this purpose. Commercial ammonium acetate is acidic, and the solution can be adjusted to pH 7 by the addition of a little ammonium.

Part of the ammonium acetate combines with the alkalis present in the bath to form practically neutral alkali acetates and ammonia. The remaining ammonium acetate decomposes progressively into acetic acid and ammonia during boiling. The small amounts of acetic acid split off are immediately taken up by the wool, and it is this acid which brings about the exhaustion *(5)*. The ammonia evolved on decomposition escapes fairly rapidly into the air. Therefore, in using an ammonium salt there is no point in measuring the pH of a bath as it will always be appreciably higher than that of the wool. The acetic acid taken up by the wool serves to protect the fiber against the action of ammonia. There should be more ammonium acetate than alkali present in the bath, and even a large excess has very little influence on the rate of exhaustion, as we can see from Figure 4.

PROCEDURE FOR MEASURING pH ——Testing with pH paper is not sufficient in this case because the solutions are very low in ions. Measuring with a pH meter or with an indicator solution is necessary. An indicator called "Cibalan Indicator" has been devolped for this purpose, which is an aqueous solution and shows an appropriate range of color change. Ten ml of the colorless bath is mixed with 3 drops of the indicator solution. The indicator is yellow in the acid range up to a pH value of 6, changing to green and then blue. The indicator turns blue at a pH of 7.5. Acetic acid has to be added gradually to attain the optimum pH for neutral premetalized dyeings, and this is indicated by a yellowish green.

It may be stated that exact pH determinations are required only when certain difficulties in leveling, penetrating or shading off are expected in processing specific wool qualities. Satisfactory results on loose wool, eg, will be obtained in general by simply applying about 3% of acetic acid, 28%.

An examination of the exhaustion curves shows clearly that the neutral premetalized dyestuffs are extensively absorbed below the boiling point. Therefore, it is important to raise the temperature slowly. After the dyebath is buffered with ammonium acetate, ammonium sulfate or acetic acid at 120° F, the well-dissolved dyestuff is added. The dyeing is continued for 10 minutes at this temperature. The temperature of the dyebath is then gradually raised to the boil over a 45-minute period. It is advisable to cut off the steam at about 175° F, to leave the bath at this temperature for 10 minutes, and only then to heat it further to the boiling point. Recently a procedure has been developed whereby dyeing is started at a temperature around 180° F or higher. In this, advantage is taken of the fact that the wool shows maximum swelling at this temperature. In this case, the well-dissolved dyestuff is slowly added to the bath at 180° F or higher, dyeing is carried out for 20 minutes at this temperature, the bath is brought to the boil and is boiled for a further 15 to 30 minutes. By this method not only are good penetration and level dyeing obtained but also a substantial saving in time.

Carpet yarns are dyed by this method on a Hussong machine whereby the dissolved dye is added to the bath at a temperature of 185° F. The bath is raised to the boil within 20 minutes and boiling is continued for 30 minutes. It is interesting to see that the shades and the fastness obtained by this procedure are the same as from application by the standard method.

In this process we do not take advantage of the migration properties of the neutral premetalized dyes under 180° F, and some dyes are not suitable for this application. Trials have been carried out in order to dye raw stock continuously

TABLE I
POTTING AND DECATIZING FASTNESS

Dyeings	Potting: 1 hour at boil — RATINGS FOR BLEEDING ON WHITE WOOL			Wet Decatizing: ½ hour at 170°F — RATINGS FOR BLEEDING ON WHITE WOOL		
	Untreated	Treated*	Untreated	Untreated	Treated*	Untreated
Test solution	Water	Water	Acid†	Water	Water	Acid†
Cibalan Yellow GRL	1	2-3	3	3-4	4-5	4-5
Ciba'an Yellow 2BRL	1	3	3	4	5	4-5
Cibalan Orange RL	1	3-4	3	3-4	4-5	4-5
Cibalan Brown 2GL	1	2-3	2-3	4	5	5
Cibalan Brown BL	1	2	2	3-4	5	4-5
Cibalan Brown TL	1	3-4	3	3-4	5	5
Cibalan Scarlet GL	1	3-4	3-4	4	5	4-5
Cibalan Red 2GL	1	3	2-3	3-4	5	5
Cibalan Bordeaux 3BL	1	3-4	3-4	4	5	5
Cibalan Bordeaux GRL	2	3-4	2-3	4-5	5	5
Cibalan Bordeaux RL	1-2	3	2-3	3-4	5	5
Cibalan Violet RL	2	3	2-3	4-5	5	5
Cibalan Blue BL	1	3-4	2-3	4-5	5	5
Cibalan Blue BRL	2	4-5	4	4-5	5	5
Cibalan Blue 3GL	1	3-4	3	3-4	5	5
Cibalan Green GL	1	2-3	2-3	4	5	4-5
Ciba'an Khaki GL	1	2-3	2-3	4	5	5
Cibalan Grey BL	1-2	2-3	2-3	3	5	4
Cibalan Grey 2GL	2	3-4	2-3	4	5	5
Average rating	1.3	3.1	2.8	3.9	4.9	4.8

* Dyeings treated in 3% of 85% formic acid on wt of fiber (owf).
† Test soln contg 0.1% formic acid, 85%, on wt of soln (ows).

near the boil, and during this application the fiber stays in contact with the dyes only for a very short period of time. The pH is adapted in order to get a rapid absorption of the dyes by the fiber.

AGITATION OF THE BATH——— As previously mentioned, the neutral premetalized dyestuffs cannot be leveled out after initial fixation. This is the reason why vigorous agitation of the dyebath is recommended.

Shading can be carried out at the boil with most of the neutral premetalized colors, after shutting off the steam. Sometimes it is advisable to add some ammonia to the diluted solution of the shading dye in order to obtain a certain retarding effect.

In the case of those neutral premetalized dyes that are not suitable for shading at the boil, the bath has to be cooled. Since at this stage of the dyeing procedure the bath is nearly exhausted, a part of the bath can be dropped and replaced by adding cold water and thus bringing the temperature to about 150° F.

Dyeings which are too heavy can be partially stripped, and faulty dyeings can be corrected without damage to the fiber by using a nonionic textile auxiliary product, such as Neovadine AN, in a fresh bath.

We know that metal-complex dyes lack the brightness of acid dyes. It is therefor necessary to employ other dyestuffs which can be dyed from a weakly acid bath to brighten certain shades. Naturally, some of those dyes do not fulfill the fastness requirements of the neutral premetalized dyes.

PROPERTIES, ADVANTAGES AND USES

FASTNESS PROPERTIES ——— As mentioned before, most neutral premetalized dyestuffs have excellent all-round fastness properties with the exception of potting fastness. Decatizing is one of the most important operations in the final finishing of wool piece goods. In wet decatizing, water at about 150° F is used. A method very similar to wet decatizing is potting, which is carried out near the boil. Although most neutral premetalized dyestuffs are not fast to potting, they are far less affected by wet decatizing. However, it has been found in the laboratory of Ciba Limited that the fastness of neutral premetalized dyestuffs to potting and particularly to wet decatizing can be improved by very simple means. It consists in treating the goods with a weak acid either in the rinse water or in the decatizing liquor. Formic acid has proved the most suitable agent, the action of acetic acid being weaker. These improvements are represented in Table I.

It is interesting to note that dyeings of even light shades have outstanding light fastness.

DYEINGS ON WOOL———we would like to outline in addition properties that are special features of the neutral premetalized dyes. Unsurpassed ability to dye wool of different origins and qualities to uniform shades is one of the first to be emphasized. No 1:2 complex dyes and other wool dyes have this valuable property to such a full degree. Equal dye absorption by different types of wool without a supplementary leveling operation proves that the fixation of this new dyestuff follows specific chemical laws, which are being studied at present. This dyeing behavior is the reason for the consistent dyeing results of different batches and for the fact that laboratory recipes can be applied in bulk work.

It has been found in practice that the spinning properties of raw stock or slubbing dyed with the neutral premetalized colors are superior to wool dyed with other colors. This can be explained by the fact that in the case of the chrome colors of the 1:2 complex type, the hexavalent chromium of the bichromate has first to be reduced to the trivalent form to permit complex formation.

Cotton or viscose resist effects are not perfect but are generally sufficient for many requirements, while acetate threads are mostly substantially stained in dyeing with neutral premetalized dyes.

It is a well known fact that dyeings of a very large number of wool dyestuffs appear differently in artificial light. Here also the neutral premetalized dyestuffs show excellent behavior. Dyeings of most of them appear practically unchanged under different light.

The fastness of dyeings of the premetalized dyes to the various shrinkproofing treatments containing chlorine is good, and a minimum change in shade is observed.

With such outstanding fastness properties it is easy to anticipate where these dyestuffs can be used to their best advantage. Excellent results have been obtained in the dyeing of raw stock and slubbing, and these are the advantages claimed:

1) Very simple dyeing method, no aftertreatment.

2) Exceptionally short boiling time.

3) Perfect condition of the tops and of the dyeings.

4) More uniform batches than when dyed with acid or chrome dyes.

5) Elimination of one to three blending operations after washing.

6) Exact reproduction of shade of different batches resulting from the fact that the dyestuff exhausts almost completely.

7) Less waste in subsequent operations.

8) Superior end product (loftier yarn, softer hand, better fastness).

9) Saving of labor and steam cost.

The dyeing of yarn on the Hussong machine or in package form is done currently and offers some of the advantages claimed for raw-stock dyeing.

In piece dyeing the quality of the material to be dyed is very important. With material of high quality that is not too tightly woven, no difficulties will be encountered. It may happen that skittery dyeings are obtained with low-

grade wool. The piece is perfectly level but the general appearance is not solid. In such a case a textile auxiliary can help to overcome this drawback.

Union dyeing is another field of application where the neutral premetalized colors have proved very interesting. Unions of wool/cotton or wool/rayon can be dyed with fast-to-light colors for the cellulosic fibers and with neutral premetalized types for the wool by a one-bath method. Cotton and viscose are only slightly stained.

DYEINGS ON NYLON——The dyeing of nylon with neutral premetalized dyes is probably just as important a field as the dyeing of wool. It has been found that the dyeings produced have an outstanding light fastness even in light shades, and also the other properties meet the most severe requirements. It is a very interesting characteristic that no specific saturation point exists when dyeing nylon with neutral premetalized dyestuffs. Consequently, there is no blocking effect of one dyestuff by another as happens in using dyestuffs containing sulfonic acid groups. The reason for this fact is seen in that fixation of the dye does not take place on the positive charge of the amino group. As the high affinity of the neutral premetalized dyestuffs has sometimes caused difficulty in dyeing polyamide fibers, the use of an auxiliary product which will slow down the exhaustion of the dyestuff is recommended.

Generally, the dyeing of nylon raw stock, spun-nylon yarn and spun-nylon piece goods present no problem. Filament yarn and pieces made of filament yarn show a barré effect, which can hardly be improved. In dyeing blends of wool and spun nylon, the nylon is generally dyed heavier than the wool, and it is rather difficult to overcome this drawback. Dyeings of blends of nylon and cotton or nylon and rayon are made without difficulty.

DYEINGS ON SILK——Excellent all-round fastness results are also obtained on unweighted or weighted silk or on mixtures of wool and silk when Cibalan dyes are applied.

PRINTING——The neutral premetalized colors have found an interesting field of application in the printing trade where prints fast to washing and to light are obtained on wool, nylon and natural-silk fabrics. These prints can be made by machine or screen printing. The new standards obtained for nylon printing are of special interest for material used in the automobile trade.

In conclusion we must state that these new dyes are notable in another respect: Probably no other new class of dyes has had its application development depend to such an extent upon co-operation between manufacturer and user. Farseeing men in the textile industry of the USA and other countries quickly appreciated their possibilities and also recognized some of the early difficulties in application. That these difficulties have been overcome and dyeing techniques continually improved is due in important measure to the enthusiastic and able contributions of chemists and dyers in the textile industry.

DISCUSSION

Question: What type of auxiliary did you have in mind for retarding the dyeing of nylon?

Answer: I did not have the intention of mentioning trade names and have mostly avoided it in my talk. However, premetalized dyes have so much affinity for spun nylon that it is difficult to get a solid shade on a mixture of spun nylon and wool. But even though Cibalan Salt N has a tendency to slow down the exhaustion of this type of dye on spun nylon, it does not entirely overcome this difficulty.

Q: Is there any way to overcome the staining of acetate by premetalized dyes?

A: Not to my knowledge. The fundamental difficulty is that they have quite an affinity for acetate. That affinity can be increased by the use of an alcohol bath and this phenomenon becomes the basis of a dyeing method. Although this method is not exactly practical, there is a firm which is doing it in a small way and produces dyeings that resist 100 hours of Fade-Ometer exposure. To return to the staining of acetate effect threads in dyeing wool with premetalized dyes, I do not know how to overcome it.

Q: What group in the dye imparts alcohol solubility?

A: Perhaps an examination of the original patents will give you your answer.

Q: Is the name "Cibalan" used only for neutral-dyeing premetalized dyestuffs?

A: Yes.

Q: Is the shade affected by infrared heat rays at about 400°F?

A: All these dyes have been tested for fastness to nylon heat setting and receive ratings of 4 to 5. I cannot specifically answer your question about infrared rays, but I would think that they are fast to such rays.

The contribution of Dr Casty of Ciba Limited concerning the chemistry of metal-complex formation is gratefully acknowledged.

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(Concluded from Page P166)

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BACKSIZING CARPETS AND RUGS*

O B HAGER

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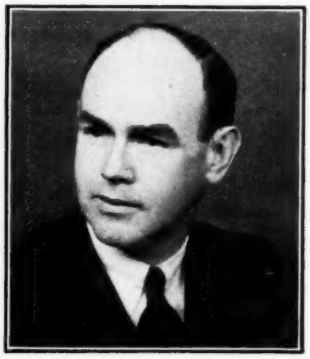
INTRODUCTION

THE title of this talk is broad in its scope. To keep within the 20 minutes of time at our disposal tonight, I shall necessarily touch only on the high spots and speak in generalities for the most part and perhaps dwell disproportionately on those aspects with which I am best acquainted. By force of circumstances, I shall have to approach the subject from the standpoint of the suppliers of materials for preparing sizes.

Backsizing is the process of applying to the back side of structurally complete carpets and rugs a film-forming adhesive material so spread as to cover all of the parts exposed to the back evenly and regulated to penetrate toward the face enough to accomplish its purposes, but no more. The purposes of backsizing are the following: 1) the binding together of all the yarns, particularly the pile yarns, to the body of the fabric, 2) the imparting of stiffness or rigidity, 3) the increasing of weight, and 4) the dressing down of fuzziness or hairiness on the back. All of the purposes and functions of the size that have been mentioned are being obtained by intricate weave constructions in the velvet and Wilton classes, which use much more yarn and stuffer material than the Axminster and tufted constructions, in which backsizing is essential. Long experience has shown that the durability of rugs made without sizing can be matched and often surpassed by sized rugs, and at considerable savings in fiber material and loom time. The economy is amply implied when it is estimated by the Carpet Institute that, of the 62 million square yards of carpeting produced in 1952, 64%, or 40 million square yards, was backsized.

APPLICATION OF BACKSIZES

The mechanics of applying backsizes are necessarily influenced by the facts that the sizes are solutions or dispersions of film-forming materials in water with various additives to modify the feel, appearance, penetration, odor, etc. These



O B Hager

The backsizing of carpets is necessary 1) to bind the yarns, especially the pile yarns, of the carpet to the general structure, 2) to impart stiffness, 3) to increase weight, 4) to dress down fuzziness, and 5) to increase durability. The author explains how sizes are applied, what materials go into their composition, and how these components are blended to get different effects. Since synthetic resins and rubbery substances are now available for carpet sizes, the properties and uses of such materials come in for important discussion.

sizes vary widely in solids content, usually 10% to 55%, and range in viscosity from 200 to 8000 centipoises.

The present trend is strongly in favor of roll application, in which a roll ranging from 8 to 14" in diameter dips into the size contained in the size box and brings the size up against the carpeting, which touches the top side of the roll. The surface motion of the roll may move in the same direction as the carpeting or in the opposite direction, depending on the need for pushing the size into the carpeting. Surplus size is scraped off and returned to the size box with a dull-edged blade called a doctor blade.

Puddle or spread coating is in practice by the minority of rug finishers, since they have a strong aversion to running the pile over rollers. Spread coating requires the carpeting to be run face down, and the size is poured, or puddled, in front of a stationary scraper, or doctor blade.

Small rugs, in finished shapes not easily joined together to be treated as a continuous strip, are sized by spraying or hand coating with a brush, small scraper, or squeegee.

Water and other volatile materials incidentally present are evaporated with the aid of heat. In the majority of plants, this is done with hot air in well-designed dryers having a high ratio of fresh-air intake to the volume of air in the dryer.

Some infrared radiation is being used, particularly as boosters for air dryers of marginal capacity but also when a short period of high temperature is needed by the size film to effect vulcanization, cure, or fusion as the material may require.

COMPOUNDING BACKSIZES

MATERIALS——Up until about the middle 1930's, most of the sizes were based on materials found in nature or prepared from them—for example, starch and its dextrine derivatives. Since then, the tremendous growth of the plastics industry has seen increasing proportions of carpeting being backsized with synthetic rubbers and resins each year until now about one-sixth of all the square yardage produced, or about ten million square yards, is backsized with this class of materials.

Since the use of starches, gums and glues as sizes is much older than anyone in this room, and nearly everyone has at least a speaking knowledge of them, I shall concentrate largely on the rubber and resin materials in the remaining time.

Textile finishing plants have traditionally worked with water solutions and dispersions. Consequently, the machinery, the buildings, and insurance rates are based on this fact. Some of the synthetic resins are made into water solutions from their solid state simply by heating and stirring. The ether, ether-alcohol, and ether-carboxylic acids of cellulose, certain polymers of vinyl alcohol, and certain polymeric salts of acrylic acid are being used in carpet sizes, mainly as additives to the starch-gum-glue sizes. They contribute useful properties to the wet size by improving the spreading and coating characteristics and add toughness, transparency and adhesiveness to the dried film.

As rubbers and most resins are insoluble in water, it is this property, among

* Presented at the Penn Sheraton Hotel, Philadelphia, Pa, on Sept 11, 1953. Submitted to the Reporter by the Editor of Proceedings on Feb 16, 1954.

others, which draws attention to them. They must be dispersed in water by complicated grinding or emulsification processes to give stable dispersions of the required particle sizes, 0.1 to 20 microns. Those resins which melt below the boiling point of water are not hard to disperse or emulsify, but the higher melting resins can be dissolved in solvents and the resulting solvent solution emulsified. Such emulsified resins can give excellent sizings, but there are on record several disastrous dryer explosions resulting from the use of them. It is safer to use the solvent-free dispersions.

Dispersions of natural rubber are made by nature and are called latex. It was used to a very limited extent in the early 1930's with very dubious success since very little was then known as to the extent it had to be protected against deterioration with age and the influence of copper, as is known now. At this time, large quantities are in use both as a self-size for the maximum in nonskid characteristic and as an additive in starch-gum-clay sizes to give greater durability against flexing.

The latex of natural rubber has been imitated by resin chemists to make latices of a wide variety of synthetic *rubbery* resins from the vinyl, acrylic and chloroprene series as well as numerous copolymers of butadiene with styrene (GR-S) and butadiene with acrylonitrile (GR-A). The latex produced by emulsion copolymerization of a 50:50 mixture of butadiene and styrene has been by far the most generally used synthetic rubber because of its low price and generally good properties as a sizing material. It has been available since January, 1945. Historically, it was preceded by latices of chloroprene (the Neoprenes) in late 1931, the butadiene-scrylonitrile latices (Hycars) in late 1940, and the acrylic ester latices (RHoplexes) in 1934. Others followed in rapid succession too numerous to mention here.

The latices of synthetic *nonrubbery* resins are used in carpet sizing largely as modifiers for the rubbery resins and the starch-gum-glue sizes because they can be selected as stiffeners for the extensible rubbers and flexibilizers or plasticizers for hard resins or starch-gum-glue sizes. These are derived from the same chemical classes as the rubbery resins and also include cellulose esters and ethers, rosin derivatives, polyamides, alkyds, polystyrene, and many others. Fairly recently, the very interesting and remarkable blend of polyvinyl chloride with butadiene-acrylonitrile has received attention as a carpet size because of its exceptional clarity, toughness of film and adhesiveness. The newness of the application carries with it some uncertainties about aging, which will have to be watched carefully.

COMPOUNDING ——— To the initiate, a backsizing compound ready for spreading on a carpet has a formidable list of components and is a fair target for a program of simplification. If he is allowed his way, he gradually replaces the discarded items, or near equivalents, until finally the formula is long and complicated again. The reason resides in the necessity for meeting three sets of basic requirements simultaneously: namely, 1) a *liquid composition,* which is stable to storage, long mechanical agitation and contact with a carpet, and which has good flow properties for proper spreading and degree of penetration into the carpet; 2) a *solid film* composition, which is easily set, or cured, or vulcanized under the drying conditions of time, temperature, and air exchange available; a film which is of the proper toughness, adhesiveness, scrub resistance, flexibility, transparency, and age resistance to all of these properties; and 3) acceptable cost. It is only by a stroke of rare luck that all of these requirements can be met in one, or two, or even three ingredients in admixture.

All of the above requirements can be met within acceptable limits by the use of the proper blends of the older and cheaper sizing materials.

If certain of the rubbery resins are to be used, their residual unsaturation will exhibit itself in poor aging characteristics unless vulcanization is induced in these resins during the drying and baking cycle. Natural rubber and all of the synthetic rubbers are improved in tensile strength, toughness, and resistance to change in color, flexibility, and rubbery properties, by causing them to react with sulfur, that is, by vulcanization. The amount of sulfur to use is importantly related to the properties desired. The speed of reaction between sulfur and rubber is slow even at temperatures too high for the good of most textile fibers. Several metallic oxides will activate the reaction appreciably, but still it remains too slow for the textile user. Certain substances, nearly all sulfur-bearing, will accelerate the reaction in the presence of the activator. Optimum degree of vulcanization is not enough, so it is necessary to add antioxidants to the mixture. Thus, every well-balanced rubber-latex compound consists of rubber, sulfur, activator, accelerator, and antioxidant in its barest essentials.

But other substances are necessary to aid pickup by roll applicators and to regulate penetrations through the fabric, these being thickening agents, such as starch, casein, gums, cellulose gums, and particularly sodium polyacrylate. Surface-active agents assist in many useful ways since they 1) aid in stabilizing the compounded size against coagulation, chalking, and livering during storage and application, 2) regulate to some degree the thixotropic nature of the size, that is, the jelly-like characteristics, 3) improve the contact of the wet size film with the fibers by displacing air, and 4) regulate in part the penetration of the wet size into the normally repellent yarns. Fillers, which are used for stiffening, weighting, and economizing, are usually kaolin-type clays and finely ground limestone, but talcs and micas are also used extensively.

Reodorants are frequently employed in sizes. They are usually blends of aromatic chemicals and oils selected for their general pleasantness and acceptability of odor and low enough in volatility not be lost during drying and baking. Experience has shown that most people do not like a high level of odor even if pleasant. Consequently, if a high-level odor is in the rug, even modifying it to a pleasant one by blending it with another odor will not be satisfactory, but masking at low levels is satisfactory. Various pigments, especially carbon black, are in use for coloring.

SELECTION OF SIZES

Selection of sizes involves many factors, many of which stem from sales or promotional needs and some from the technological requirements to accomplish the sizing demands for the fabric construction under consideration. The finisher will naturally attempt to use the least expensive size capable of giving the most in desirable properties. Any attempt to classify sizes by properties is dangerous since the infinite number of blended materials that can be used makes drawing the lines of classification difficult. Therefore, the following statements are given to indicate the prominent or predominant properties carried into the size by the several ingredients.

Starches, glues, some gums, rosin, and asphalt are, as a class of natural materials, less expensive than rubbers and synthetic resins as a contrasting class of synthetic materials. This readily explains why these natural products have the lion's share of the backsizing business, since they also very well fulfill the basic purposes of a size. These sizes have some shortcomings, however, in that they 1) complicate cleaning or scrubbing with water, 2) are excellent foodstuffs for mildew, decay organisms, and insects, 3) vary widely in stiffness and extensibility with changes in relative humidity, and 4) cannot be compounded to give the high degree of elasticity required in heavy backings on tufted rugs, many novelty Axminster types, and automotive carpeting.

(Concluded on page P177)

1953 Annual Convention ——Wool Group

THE NATURE OF THE MODIFICATIONS OF WOOL BY VARIOUS "CHLORINATION" PROCESSES AND THEIR EFFECT ON THE WEAR LIFE OF SHRINK-RESISTANT MATERIALS*

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INTRODUCTION

IT HAS frequently been stated that the tendency of wool and other animal hair fibers to felt constitutes one of the most unique and important properties possessed by any class of fibers. On the one hand, it has contributed in a major way to the successful use of wool in a great variety of clothing and industrial fabrics. In contrast, it often reduces the usefulness of wool in items for which this fiber is admirably suited but which require frequent laundering. It is little wonder, therefore, that considerable effort has been directed towards the development of shrink-resistant treatments, and, in recent years, use of such treatments has greatly increased the useful wear life of many wool garments for military and civilian purposes.

A recent survey of the literature indicates that about 60 processes have been described for the production of shrink-resistant wool, and of these about half involve the use of chlorine. Such a large number of chlorination[1] processes suggests that wool can be treated under a great variety of conditions. It is unfortunate, however, that there has been a tendency to consider all chlorination treatments as being more or less similar, although, in practice, they result in very different types of modification of the fiber and yield different degrees of shrink resistance for a given amount of modification. Broad statements such as "chlorine removes the scales from wool" persist in the literature, although they are only descriptive of the effect of chlorine under certain conditions of use. Actually, it is now possible to eliminate the felting properties of wool effectively by proper treatment with hypochlorites without producing any readily discernible changes in the scale structure *(7)*. It is the purpose of this paper to describe some of the important variables in chlorination treatments and to indicate their influence on the extent of modification and useful wear life of such treated materials.

D Frishman

Shrink-resistant wool is most widely produced today by many variations of the so-called "chlorination" processes. There is a general tendency to consider all such processes and their effects on the over-all properties of wool as being very similar, whereas, in practice, they differ widely in the degree of shrink resistance obtained and in the extent to which they modify other desirable properties of the fiber. The present discussion considers the fundamental basis for these differences and demonstrates the bearing of such differences on the useful life of treated materials as determined through actual wear tests. Data are also presented which confirm the utility of the alkali-solubility test as a measure of the changes produced in wool by oxidative treatments.

REACTION BETWEEN WOOL AND ACTIVE CHLORINE

When a wool fabric is laundered, two types of shrinkage can occur. First, it may shrink as a result of relaxation of tensions which are developed during processing of fiber, yarn and fabric. Second, it may shrink as a result of the tendency of the fibers to migrate and form a dense, interlocking, matted structure. The first is known as relaxation shrinkage and is common to nearly every type of textile material; the second, known as felting shrinkage, is largely confined to materials containing animal hair fibers *(5)*. Whereas relaxation shrinkage may be largely eliminated by allowing the wet fabric timer to reach equilibrium dimensions, followed by drying without tension, prevention of felting shrinkage demands recourse to methods which bond the fibers together or which alter the surfaces of the fibers so they can no longer migrate. It is now generally recognized that chlorination treatments prevent migration and felting by altering the surface of the fiber, as described below *(3, 6, 8, 13, 14, 15, 18, 19, 20, 21)*.

The surface of a wool fiber consists of a series of overlapping scale cells, which resemble the shingles on a roof *(1, 11)*. These are so arranged that when a fiber is rubbed from tip towards root, it is considerably rougher than when rubbed in the reverse direction. The net effect is two coefficients of friction and a tendency for the fiber to migrate in the direction of least resistance, namely, towards the root. A typical example of the effect of a chlorination treatment in modifying frictional properties is shown in Table I, where treatments A, B, C, and D indicate different levels of treatment. It may be seen that increasing the intensity of treatment produces a decrease in the friction difference, and an increase in the over-all "roughness", both of which probably contribute to stabilization of the fabric.

* This work constituted a part of the Army Quartermaster program on the shrink-resistance of wool for military clothing, which is under the supervision of the National Research Council Committee on Textile Finishing Research. It was presented by D Frishman before the Wool Group in the Conrad Hilton Hotel in Chicago on Friday morning, Sept 18, 1953. Submitted to the Reporter by the Editor of Proceedings on Feb 1, 1954.

[1] In the textile industry "chlorination" relates to those processes in which wool is oxidized with chlorine, while in organic chemistry "chlorination" implies the addition of a chlorine atom to a molecule.

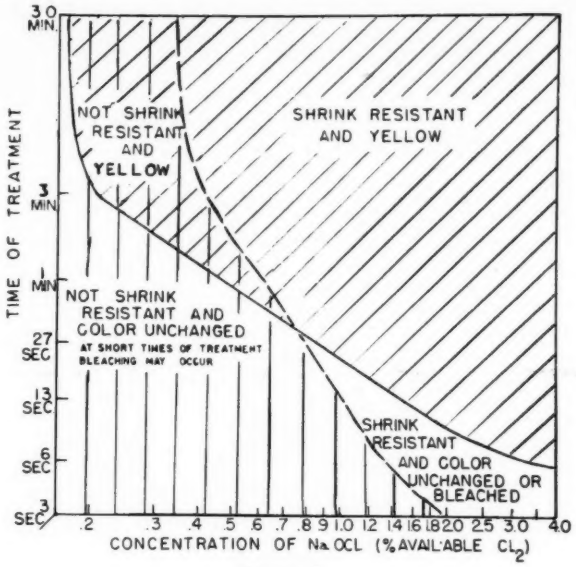
TIME OF TREATMENT
3.0 MIN.
3 MIN.
1 MIN.
27 SEC.
13 SEC.
6 SEC.
3 SEC.
NOT SHRINK RESISTANT AND YELLOW
SHRINK RESISTANT AND YELLOW
NOT SHRINK RESISTANT AND COLOR UNCHANGED
AT SHORT TIMES OF TREATMENT BLEACHING MAY OCCUR
SHRINK RESISTANT AND COLOR UNCHANGED OR BLEACHED
.2 .3 .4 .5 .6 .7 .8 .9 1.0 1.2 1.4 1.6 1.8 2.0 2.5 3.0 4.0
CONCENTRATION OF NaOCL (% AVAILABLE Cl2)

Figure 1
The shrink-resistance and color of wool fabric as a function of the time of treatment and concentration of chlorine.

From the foregoing it is apparent that the ideal chlorination process would be one that solely attacked the extreme outer surface of the fiber. This proved doubly desirable when the great reactivity of wool with active chlorine was considered. One way to accomplish this was to limit the time of contact of the fiber with the treating solution so that penetration of the hypochlorite into the fiber could not occur. A study of the pH-concentration-time relationships soon demonstrated critical areas where maximum shrinkage control with minimum modification of the fiber was obtained. In view of earlier findings *(7)* that maximum control with minimum modification of fiber could be obtained in slightly alkaline solutions of hypochlorites, more detailed studies were carried out in these regions. A typical result obtained at pH 8.4 is shown in Figure 1. Examination of the results show that fabrics varying in color and in shrink resistance are obtained. The area to the right of the broken line describes conditions of chlorine concentration and time which yield fabrics of excellent shrink resistance. The area to the right of the solid line denotes conditions which result in yellowing of the wool. For shorter times of treatment there is a relatively small area in which excellent shrink resistance can be achieved without causing the wool to yellow. It is interesting to note that the wool industry has been reluctant to use alkaline chlorination treatments because of the yellowing that occurs under ordinary conditions of use, such yellowing being associated with degradation of the fiber. The data in Figure 1 offer additional evidence of the importance of limiting the reaction to the surface of the fiber, and it must be concluded that any "internal" action of the hypochlorite in the fiber can only be of a harmful nature.

Further evidence supporting this conclusion is found in studying the chlorine consumption during rapid or continuous processing of the wool (10 seconds or less) as compared with the slower, slow process (several minutes or more). In both laboratory and commercial treatments, in which excellent shrink resistance was achieved, only 1 to 3 percent of available chlorine owf (on weight of wool fiber) reacted with the wool during the rapid chlorination as compared with 6 to 9 percent of available chlorine during slow treatments. That this "excess" available chlorine consumed in slow treatments is not effectively utilized for producing shrink resistance and probably has a deleterious effect on the fiber will be shown in the following section describing studies on the wear life of various treated materials.

TABLE I

RELATIONSHIP BETWEEN FRICTIONAL PROPERTIES OF FIBERS AND SHRINKAGE

	*Frictional Properties**			*Felting Shrinkage*
Treatment	μ_1	μ_2	$\mu_1-\mu_2$	%
Control	0.52	0.28	0.24	38
A	.49	.32	.17	30
B	.49	.35	.14	22
C	.50	.42	.08	7
D	.65	.60	.05	3

* μ_1 and μ_2 are the coefficients of friction in the anti-scale and with-scale directions, respectively.

WEAR TESTS ON SHRINK-RESISTANT WOOL

Wool garments can fail in service through actual "wearing out" or as the result of excessive shrinkage. The latter type of failure can be largely controlled by suitable shrink-resistant treatments and in fact, millions of pounds of wool per year are currently being so treated, largely by chlorination processes. In view of the known reactivity of wool with hypochlorites and the frequent statements concerning the degradation of the fiber by such treatments, a relatively large scale wear test was conducted. The test was designed to study the relative efficiencies of several different types of treatments and to provide a basis for evaluating the relationship of wear to degree of modification.

The test was performed with lightweight, unreinforced wool socks in order to expedite the testing program. Several levels of treatment were applied by commercial processes, typical of the rapid and slow types. Forty socks were used for each degree of treatment, statistical analyses of the results indicating this to be a reliable sample. The socks were worn by a group of male high school students as well as by male personnel of this laboratory. After each day of wear, the socks were collected and a clean pair was issued. The socks were laundered[2], treated with a mild fungicide, dried and examined for shrinkage and holes. As soon as a hole was noted, the sock was considered to have failed and was withdrawn from the test. In addition, the rejection by three subjects of a sock as too small (for a given size class) as the result of shrinkage during laundering constituted a failure. It was found that shrinkage of about 10 percent or more, as measured on the Schiefer sock-measuring device *(16)* under a 2-pound load correlated with rejection by the test subjects.

The results of the test are shown in Table II, the data being arranged in order of increasing shrink resistance of the samples[3]. Analysis of the data showed that, when the level of treatment is too low, many of the socks fail as a result of shrinkage. Optimum wear life is obtained at the point where shrink resistance is ex-

[2] The Army Mobile Laundering procedure for wool, slightly modified for this test, was used. The procedure involved two 5-minute suds and three 3-minute rinses, 100°F, and a water level of 10 inches for the suds and 12 inches for the rinses. The machine was stopped during the draining and refilling. A 24-inch wash wheel was used.

[3] The Alkali solubility (in Table II) is defined as the percent loss in weight of one gram of wool which has been kept in 100 ml of 0.1*N* NaOH for one hour at 65°C, and then rinsed and dried. The greater the increase in alkali solubility of the treated wool over that of the untreated wool, the greater has been the degree of damage or modification. Since treatments with oxidizing agents increase the susceptibility of wool to attack by alkalies, this test has been very useful in detecting chemical damage, of this type *(9, 10, 12, 17)*.

cellent and modification is slight.

A comparison of the two types of treatments offers additional and corroborative evidence that the chlorine consumed in the slow method may adversely affect the properties of the fiber, without at the same time imparting sufficient shrink resistance. For example, treatment 2 of the rapid method and treatment 3 of the slow method are practically identical with respect to alkali solubility, but the shrink resistance of the former is far superior to the latter. When the level of treatment in the slow processes was raised sufficiently to eliminate felting shrinkage (sample #4), the degree of modification as measured by the alkali-solubility test was high, and the socks failed sooner by wearing out. Where the degree of modification is excessive irrespective of type of treatment, the difference in results disappears, but it should be noted that, in order to achieve a high degree of modification (i e, high alkali-solubility) by the rapid method, repeated treatments were necessary. This is of course tantamount to making it a slow treatment.

The results of the tests made it apparent that the action of the chlorine must be very different in the two types of treatment, and further study has indicated that a principal difference is found in the uniformity of the reaction with the wool. Uniformity of reaction can be investigated by determining the number of fibers whose surfaces have been modified. A useful technique for this purpose is the Kiton Red G dye test, which has been shown *(4)* to stain wool at room temperatures when the fiber surfaces have been attacked by chlorine. The fibers are dyed in a standardized way, cut into sections about 100 microns long, and the number of sections which are undyed and dyed are determined by counting microscopically. In this method untreated wool shows dyeing of some fiber sections; hence it is necessary to compare results before and after treatment. The measurements are shown in Table III. An outstanding feature of these data is that appreciably more fiber sections have been treated by the rapid method than by the slow method in spite of the fact that more active chlorine is consumed by the slow method. Since less active chlorine is consumed in the rapid method, it must be concluded that the reaction is more uniform and essentially limited to the surface of the fiber. In contrast, the lack of uniformity in the slow treatment and greater consumption of chlorine leads to the conclusion that relatively small areas of the fiber are more vigorously attacked resulting in degradation of the fiber through the production of "weak spots" or overtreated areas. In other words, it is lack of uniformity of treatment and failure to limit the treatment to the outermost surface of the fiber which accounts for the decrease in breaking strength (shown in Table III) and poor abrasion qualities which have been reported for many chlorinated materials. The increased breaking strength of the fabric treated by the rapid chlorination method can probably be attributed to the increase in coefficient of friction of the fibers.

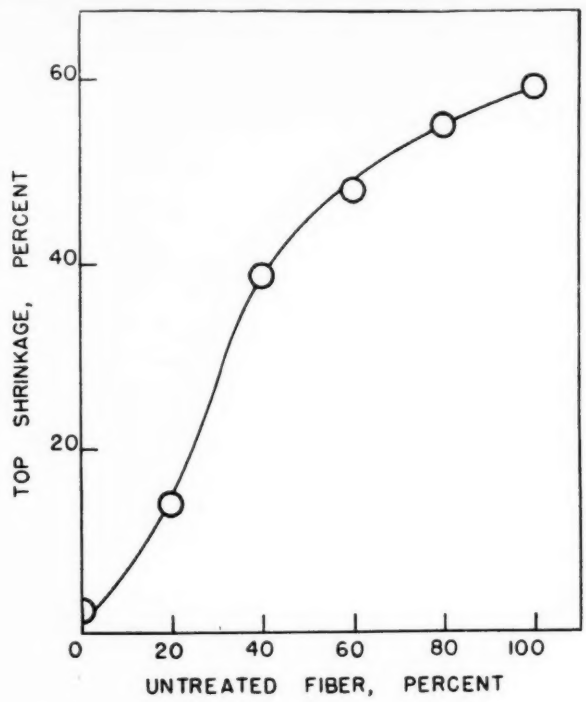

Figure 2
The shrinkage of top as a function of untreated wool present.

TABLE II

THE RESULTS OF THE WEAR TEST ARRANGED IN INCREASING ORDER OF SHRINK RESISTANCE

	Rapid Treatment			*Slow Treatment*		
Experiment Number	*Wear Life*	*Alkali Solubility Increase*	*Failure as a Result of Felting*	*Wear Life*	*Alkali Solubility Increase*	*Failure as a Result of Felting*
	days		*%*	*days*		*%*
1	9.6	4.6	42	2.7	2.6	97
2	11.3	6.4	0	5.4	6.2	69
3	8.2	10.3	0	6.0	6.6	57
4	4.0	12.0	0	5.0	8.0	0
5	2.7	18.8	0	3.4	19.0	0

TABLE III

THE PERCENTAGE OF UNTREATED FIBERS, SHRINKAGE DURING LAUNDERING AND BREAKING STRENGTH AS A FUNCTION OF THE TIME OF TREATMENT

Time of Treatment	*pH*	*% Available Chlorine Consumed on the Weight of Wool (approx)*	*Percent Untreated Fibers*	*Area Shrinkage During Laundering %*	*Percent Change in Breaking Strength**
minutes					
Untreated	...	...	66	60	...
30	8.4	5	35	7	—3
0.10	8.4	1	0.8	0	+7

* Negative sign indicates percentage loss in breaking strength compared with the untreated fabric, while a positive sign indicates a gain in strength.

Finally, in addition to minimizing modification, the importance of uniformity of treatment for optimum shrink resistance cannot be overemphasized. For example, the data in Table III show the presence of untreated fiber sections and also a certain residual shrinkage for materials treated by the slow treatment. This is not surprising since, as shown in Figure 2, the presence of even small amounts of untreated wool markedly increases the tendency of a shrink-resistant material to felt *(2)*.

SUMMARY AND CONCLUSIONS

1) Chlorination treatments for wool vary considerably with respect to the degree of shrink resistance and extent of wool modification they produce.

2) Since chlorine produces shrink resistance by changing the surface frictional properties of the wool fibers, the reaction should be limited to the surface of the fiber.

3) Rapid treatments with chlorine limit the reaction to the surface of the fiber, consume less chlorine and provide greater uniformity of treatment as compared with batch chlorinations.

4) A consequence of the greater efficiency and uniformity of treatment of the rapid method is a greater degree of shrink resistance and relatively less fiber modification as compared with slow chlorinations.

DISCUSSION

Question: Do you have any information on the relative wear life of dry-chlorinated wool?

Answer: We do not have such information.

Q: Were the chlorination treatments carried out at room temperature?

A: Yes, all treatments described were carried out at 75°F.

Q: What were the relative concentrations of chlorine used in the rapid and slow treatment?

A: In answering this question it is necessary to distinguish between the concentration of available chlorine in the treating solution and that quantity of chlorine which is consumed by the wool. In rapid treatments the concentration of chlorine in the solution is relatively high but because of the short period of contact between the wool and the solution only a small quantity of chlorine is actually consumed. In contrast, the concentration of chlorine in the bath is low during a slow treatment but the time of the reaction is usually sufficient for almost all of the chlorine to react with the wool. The net effect is that more chlorine actually reacts with the wool during a slow treatment than during a rapid treatment.

Q: Were the test socks chlorinated in commercial hosiery equipment or in special equipment?

A: The treatments were carried out in laboratory equipment.

Q: How does resin-treated wool compare with "chlorinated" wool with respect to shrinkage and wear?

A: We have not made such comparisons. It should be noted, however, that it would be dangerous to make generalizations since there are many types of resin treatments just as there are many types of chlorinations.

Q: How does one decide on optimum conditions for treating different grades of wool?

A: Little or no change in conditions are required for different grades of wool. Fabric structure is a more important variable in this respect.

The assistance of Mary C Moriarty and Marilyn D Ellison in performing the wear test is thankfully acknowledged.

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Backsizing—

(Concluded from Page P173)

The rubber and resin sizes perform all the basic functions of a size and provide a very high degree of resistance to removal by wet scrubbing, attack by microbial and insectile life, and flexibility in high loadings. The rubbery types, in contrast with other resins, contribute materially to erectness of pile and rapidity of recovery when crushed. For nonskid properties, natural rubber is without peer. The copolymers of butadiene and acrylonitrile, the GR-A rubbers, are used for their outstanding resistance to swelling by ordinary lubricating oils. For the utmost in fire resistance, the latices of the resins from the chloroprene, vinyl chloride, and vinylidine chloride series would be used. Anyone wanting to use these resins is cautioned to get expert advice from the manufacturers on the proper way to use them since, under some conditions, they will split out hydrogen chloride and cause tendering.

Currently, a large proportion of backsizing uses a combination of the starch and latex types. The ratio of rubber to starch in these blends varies from about 20% to 100% of dry rubber to dry starch. Small amounts of rubber are effective in reducing the cracking and flaking of the starch films, particularly in very dry weather. Larger amounts give increased protection in this respect and, of course, more flexibility. If fillers are also in the starch sizes, additional rubber is added over that required for the starch to bind the filler, the amounts ranging from one-third to equal parts dry rubber to dry filler. It is very common that, in addition to rubber in starch sizes, some of the tackifying resins will be used to increase the adhesion of the size to the fibers. Hydrogenated rosin esters are particularly good in this application.

CONCLUSION

In closing this talk, I believe it will interest you to comment on some recent developments concerning the backing of rugs, which at first glance do not appear closely related to backsizing. I refer to the application of foam-rubber latex directly to the back of presized fabric so that the rug cushion or underlay becomes an integral part of the rug. Over the last three or four years, much experimental work has been done along these lines in a number of directions, and some of the products are now on the market. Until the manufacturers make their own announcements, I do not desire to go into greater detail at this time.

As a parting remark, I wish to say that failure to mention a product or class of products is not to be construed as a deliberate oversight, but rather a matter of judgment as to which of the older and widely known materials would best illustrate the points discussed.

Piedmont Section——

NAPHTHOL DYEING*

ROBERT H NUTTALL
American Aniline Products, Inc, Charlotte, N C

Procedures are given for the practical application of naphthols on cotton piece goods, yarn and raw stock. Some of the pitfalls are pointed out which may cause uneven dyeings or dyeings of poor crocking fastness. Various methods are compared for their practicability. The dyeing of Dacron with naphthols is also shown.

DISSOLVING NAPHTHOLS

TOO much attention cannot be paid to the preparation of a naphthol solution. This is especially true of the substantive naphthols, which are used in dyeing yarn and raw stock.

The sensitivity of the naphthols can be shown by preparing solutions of Naphthol AS-SW, in one case with distilled water, and in the second case with tap water. The sample prepared with distilled water will remain in solution longer than the tap-water sample. Further, waters from different localities have varying effects on the stability of the solutions, depending on the purity of the water. While this indicates that the naphthols might be difficult to handle, it does not mean that with proper care good results cannot be obtained.

Two methods are used to dissolve naphthols: the cold method with alcohol and the hot method with Turkey red oil. By the cold method the naphthols are first pasted with 3 gal alcohol for every 10 lb naphthol. Dissolve separately equal weight of caustic soda flakes to naphthol, being careful not to use too much water. Add the caustic soda solution carefully to the alcohol and naphthol until a clear solution is obtained. The balance of the caustic soda should be saved to spring the dyebath. Water at 200° F is added to the naphthol solution.

By the hot method the napthol is first pasted with Turkey red oil and thoroughly mixed. Hot water is added and the naphthol is put into the mixing tank containing about 20 gal of water. Heat is applied and caustic soda flakes are scattered in, the heating being continued until a clear solution is obtained.

In plants using liquid caustic, the caustic liquor should be diluted with some hot water before addition to the naphthol bath.

NAPHTHOLATION

It is generally conceded that careful naphtholation is the answer to most of the difficulties which grow out of naphthol dyeing. The method of application of the naphthols is pretty much the same for hosiery, packages, cheeses, beams and raw stock. Only the substantive naphthols can be used for textiles in these forms.

In dyeing raw stock, one difference is noted, and that is that it is imperative to couple with Fast Color Bases rather than Fast Color Salts.

In dyeing hosiery, it is generally necessary to naphtholate at the elevated temperatures of 130-140° F to obtain penetration. Where Naphthol AS-BR is employed in conjunction with Naphthol AS-SW, it is necessary to raise the temperature to 140-150° F, since Naphthol AS-BR has its greatest affinity at 150° F. Further, where Naphthol AS-SG is used with Naphthol AS-SW, it is necessary to naphtholate at 160-170° F, since, at low temperatures, Naphthol AS-SG is highly substantive; thus, uniformity is gained by naphtholating at the higher temperature. The same procedural modifications are applied to packages, cheeses, and raw stock.

DYEING PIECE GOODS

Three methods can be used for dyeing piece goods:

1) Naphtholation with substantive naphthols on the jig and coupling on the jig.
2) Naphtholation on the padder and coupling on the jig or on the three-bowl pad continuously.
3) Naphtholation with nonsubstantive naphthols followed by drying, then coupling on a three-bowl pad with continuous washing and drying.

1) NAPHTHOLATION AND COUPLING ON THE JIG———The roll of cloth is first wet out with a good wetting agent at 190° F. The jig is set at a volume of 60 to 70 gal at 110° F, sprung with some caustic soda and the goods run one end. Two-thirds of the naphthol is added, the roll is given one end, the balance of the naphthol is added, and one more end is given. Four more ends are given while 15 lb of salt is being gradually added to the jig load. The liquor is dropped and the jig is prepared with 30 lb salt in cold water, adding ice if necessary. After two ends are run, this brine solution is dropped and a fresh bath is prepared with Fast Color Salt or Base at 50° F. Two-thirds of the Fast Color Salt is put in the first end, the remainder, on the second. A number of ends are necessary to reach a complete depth of shades. Wash and soap.

2) NAPHTHOLATION ON PADDER ———In this case the naphthol is padded on the cloth, which is then batched up wet. The roll is given two ends on the jig with 25 lb salt in 60 gal cold water, and coupled in a fresh bath, rinsed and soaped, as above.

3) NAPHTHOLATION OF NONSUBSTANTIVE NAPHTHOLS ——— The nonsubstantive Naphthols AS, AS-D, AS-MX, AS-OL, AS-BS and AS-G are predominantly used. The naphthol is padded on a 2-bowl pad at 190° F, dried in a hot flue and coupled continuously on a 3-bowl pad with a suitable skying arrangement. The goods are continuously soaped, washed and dried in one operation.

The first method above is fast losing favor for cottons because of high costs in time and labor commensurate with low production. The second method is rarely used for piece goods dyeing. The main objection is the difficulty of removing the excess amount of caustic soda, which is required to keep Naphthol AS-SW in solution, thus making it practically impossible to get an even coupling on the jig. Both methods 1 and 2 require the use of the more substantive naphthols,

* Presented at the Annual Meeting of the Piedmont Section in the Hotel Charlotte, Charlotte, N C, on Sept 12, 1953. A corrected manuscript was received by the Editor of Proceedings on Feb 10, 1954 and submitted to the Reporter on Feb 15, 1954.

which are higher in cost than the nonsubstantive naphthols. The third method, with nonsubstantive naphthols, is fast being recognized as the most profitable way to dye this type of color on cottons. The coupling action is extremely rapid on the dry cloth, and a full coupling is obtained on a 3-bowl padder with a skying arrangement. A tandem setup, whereby the cloth is continuously coupled, washed and soaped, makes for good production. Further, small additions of the more substantive naphthols can be used along with the nonsubstantive naphthols to obtain a wider range of shades. In such cases the feed liquor should contain 15 to 25% more of the substantive component over the original pad mixtures to compensate for its greater pick up.

A modification of Method 2 is being employed which has given notable success. In this method a substantive naphthol is padded on a 2-bowl pad, run over a series of cooling rollers, then coupled on a 3-bowl pad. To be successful, a skying arrangement is necessary, which gives more time in the coupling box. This skying permits the cloth several seconds after the first dip and before the first nip, as well as before the second nip. This longer passage in the coupling box, plus the extra squeeze of the two nips, gives a better penetration than can be obtained on the jig. Naphthols AS-SW, AS-TR, AS-ITR, AS-BO and AS-SG are suitable for this purpose; however, continuous naphthol dyeing by this method does not yield dyeings of as good fastness to washing or crocking as those made with nonsubstantive naphthols.

COUPLING———In using bases which must be diazotized, certain precautions should be followed. The base is dissolved with hydrochloric acid, then sodium nitrite is added to produce the diazotized base. It is important here that the temperature be brought down to about 28° F by the use of plenty of ice. It is important that the nitrite solution be made with very little water. Further, the nitrite solution should be added very slowly as the solution may be broken by too rapid addition of the nitrite. When diazotization is complete, the solution is neutralized with sodium acetate. The necessity of adding the sodium acetate slowly cannot be overemphasized, for if added too rapidly, a partial precipitation of the base can occur, which is generally not noticed until the coupling has taken place and the damage is done. This applies to piece goods as well as to raw stock, packages, beams, etc.

Fast Color Salts can easily be put into solution in cold water. A little Stabilon or prototype thereof is added to the solution, and, after standing for about 20 minutes, 2 to 3 pints acetic acid, 56%, for every 50 lb of Fast Color Salt or Fast Color Base is added. The acetic acid is diluted before addition to the solution of Fast Color Salt. This addition is generally made just before the Fast Color Salt solution is added to the expansion tank and is done to bring the pH to 4-5, which is the correct condition for coupling. The same applies to tanks where the coupling takes place in continuous dyeing.

A word about naphtholation on the padder, be it a 3-bowl or 2-bowl pad. Best results are obtained when the bottom roll of the padder turns in the pad solution. This is especially true where narrow goods are run on a wide padder and when substantive naphthols have been added to nonsubstantive naphthols.

There are many good products available for cleaning up the naphthol dyeing after the coupling. These may be used along with tetrasodium pyrophosphate, Calgon or Quadrafos. However, the success or failure of the naphthol dyeing is determined before this stage is reached.

DYEING DACRON WITH NAPHTHOLS

Before concluding my paper, I would like to show you a number of skeins of Dacron yarn which were wound off from a package dyed according to the following procedure:

1) The Dacron package is scoured in the machine at 160°F for 15 minutes with 1% Orvus owf (on weight of the fiber). This liquor is then dropped.

2) The machine is refilled with fresh water and brought to a temperature of 120°F. To this is added a solution of the following composition:

7.5	g	Purasist
0.25	g	Stabilon
15	ml	alcohol
25	ml	hot water

(This mixture is boiled for solution.)

The total volume of liquor at this point is 3 liters. This solution is circulated for 10 minutes. Bath is not dropped.

3) The color base is dissolved with heat in 48% alcohol and 2% Stabilon owf and strained into the bath, which has been raised from 120-140°F. The temperature is then raised to 212°F and the liquor is circulated for 15 minutes.

4) The naphthol is dissolved in 48% alcohol with heat (0.7% caustic may be necessary to produce a clear solution). The steam flow to the machine is stopped and this naphthol solution is strained slowly into the bath. The temperature is brought back to 212°F. The usual alternating circulation is continued (5 minutes inside out, 5 minutes outside in) for 15 minutes.

5) The temperature is raised to 250°F, and alternating circulation is continued for 1 hour.

6) The bath is cooled to 140°F. The package is rinsed with water. An 8% solution of sodium nitrite is circulated for 5 minutes (2½' in, 2½' out). Then, 12% hydrochloric acid, 32°Tw is added and circulation is continued for 15 minutes. The temperature is raised to 200°F slowly, and the circulation is continued for 40 minutes at this temperature. This bath is dropped and the package is given a running wash for 10 minutes. It is soaped at 212°F with 2% Stabilon and 1% caustic for 20 minutes. This bath is dropped and the package is further treated at 180°F with a solution containing 2% ammonia and 2% Stabilon for 20 minutes. This bath is dropped. The package is given a washing and final soaping at 180°F with a solution containing 2% soda ash, 2% hydrosulfite and 2% Stabilon for 20 minutes. A final hot wash, followed by drying, completes the operation.

I wish to extend my thanks to Mr C B Ordway, Head of the Technical Department of our Chattanooga Branch, for his extensive work on the dyeing of Dacron with naphthols.

Mr Ordway has been working for some time on the application of various dyes to both Dacron and Orlon. Naphthols, of course, have been included in this survey. Those of you present who may have further interest in this phase of dyeing, might do well to contact Mr Ordway, who will be happy, I know, to render whatever service he can with regard to information on the dyeing of Dacron and Orlon.

"The group of fifteen editors responsible for this monograph consists of a well-balanced cross-section of American industry concerned with the production, marketing and application of vat dyes. The AATCC is to be congratulated on the production of a comprehensive survey of American vat dyeing and printing practice which is the major theme of this application . . . the book will be useful as a work of reference at this side of the Atlantic and as a working manual for the American colorists for whom it was designed. . . . If a clear account of American practice is required . . . the enquirer *must* have access to this volume".—*JOURNAL OF THE TEXTILE INSTITUTE* (England).

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". . . this monograph should be in the hands of every user of vat dyestuffs, every student and every teacher. The book is well indexed and includes valuable lists of equivalent trade names. It will certainly take its place as a standard book of reference".—*JOURNAL OF THE SOCIETY OF DYERS AND COLOURISTS* (England).

REPORTS FROM THE LOCAL SECTIONS

WINTER MEETING

MID-WEST SECTION

CHICAGO, ILL

FEBRUARY 13, 1954

Officers and Guest Speakers

Seated (l to r): H W Ericson, Mid-West Section secretary; H W Stiegler, AATCC director of research; J G Stott, chairman; A I Hultberg, vice chairman; E Morrill and A T Brainerd, councilors.

Standing: J H Jones, vice president, Western Region; A J Olson, past chairman; J E Norton, speaker; S Klein, councilor; J G Kelley, treasurer.

(L to r): E J Sindt, H A Wills, W S Paddock, F J Acker and R B Lueg, National Aniline Division, Allied Chemical & Dye Corp; G H Johnson, National Inst of Laundering; Scott Brainerd, Munsingwear; E W Camp, National Aniline.

(L to r): K Myers, American Cyanamid Co; J R Beutert, Sears, Roebuck & Co; C M Helm, American Cyanamid Co; A J Andrews, Keystone Aniline & Chem Co, Inc; W H Boultman, The Best Foods, Inc.

Mid-West Section

THE Winter Meeting of the Mid-West Section was held at the Bismarck Hotel, Chicago, Ill, on February 13, 1954.

The afternoon session was called to order by Vice Chairman A I Hultberg at 2:15 with approximately 80 members and guests present. Mr Hultberg presented Chairman J G Stott, who read the following eulogy on the passing of Elmer Smith:

"You have all heard, or read in the Dyestuff Reporter, of the passing of one of our outstanding members—Elmer Smith, vice president of American Aniline Products, Inc. His presence, as well as his wise counsel, important factors in the building of the Mid-West Section, will be missed by all of us.

I had known him for many years—since 1928, when he was the last president of the Spectrum Club, the forerunner of our present organization. He served the Section wisely and well in many capacities, such as chairman of the 1947 Convention, and as advisor for the most recent Convention, held last year in Chicago. He also served as Councilor.

I do not need to mention his business career, as it is well known by you all.

At this time, I request all present to stand in tribute to his memory."

Following the secretary's and treasurer's reports, Mr Stott read a letter from C Fred Gurnham, Chairman of the Section's Stream-Pollution Committee, referring to a convention in Atlantic City on the subject.

Arthur Brainerd reported as Councilor, after which Merrill Morris reported on the progress of the Section's Intersectional Contest Committee. Mr Stott appointed a judge and an alternate for the '54 Contest in Atlanta.

Joseph Jones announced that arrangements had been completed for the annual outing on June 12 at Lake Lawn Lodge, Delavan, Wis.

Speaker of the afternoon was Joseph Norton, technical director of Atlas Electric Devices Co, on the subject "New Recommended Test Conditions and Operating Practices for Light Fastness Tests in the Fade-Ometer".

Eighty-four members and guests were present at the evening session to hear Harold W Stiegler, AATCC director of research, speak on "Your Stake in the AATCC".

Washington Section to Meet at NID

THE Washington Section will hold its next meeting at the National Institute of Drycleaning, Silver Spring, Md, on April 9th, at which time a symposium on the cleaning of textiles will be conducted. Speakers will include Anthony M Schwartz ("Some Principles of Detergency"), Albert R Martin ("Drycleaning of Textiles"), and Suzanne Davison ("Some Problems in Home Laundering").

—♦ ♦—

NBITT Student Chapter

THE Student Chapter of the New Bedford Institute of Textiles and Technology met on February 5, 1954 with twenty members present. It was voted that each member be assessed 50¢ per semester for expenses. An invitation to attend the next meeting of the Rhode Island Section in Providence was received. Alicia Mikus, William Etchells and William Markey were appointed a committee to select a topic for a Student Contest Paper.

HISTORICAL NOTES ON THE WET-PROCESSING INDUSTRY

III—The Contributions of Thomas Cooper

SIDNEY M EDELSTEIN
Dexter Chemical Corporation

This is the third in a series of historical articles which the textile chemist and colorist will find of interest.

The author, a prominent science historian, is the founder of an outstanding collection of great works, documents and letters in the history of chemistry and related sciences.

Articles and illustrations in this series are from the author's library.

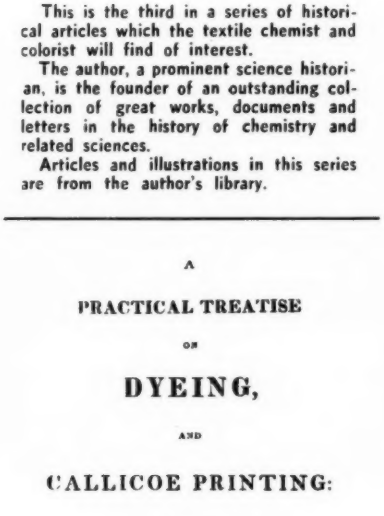
Thomas Cooper

A rare silhouette of Cooper.

"THE government of the United States is the government of the people and for the people."

These are not the words of Abraham Lincoln, but those of an ardent Nullifier, pro-slaver and the second president of the University of South Carolina—a man completely opposed to most of Lincoln's political ideas. At the same time this man was one of the first to introduce the use of chlorine as a commercial bleaching agent. I refer to Thomas Cooper, dyer and "callicoe" printer.

It is also an anachronism that Thomas Cooper, Oxford graduate and Englishman, lies buried in Trinity cemetery, Columbia, S C, in the very heart of the modern bleaching and dyeing industry, unknown and unsung by the industry in which he and his associates were great pioneers. Yet Cooper's book on dyeing *(1)*, published in Philadelphia in 1815, was probably the most important single influence which guided the infant dyeing industry in the United States along scientific and modern lines. In the preface of this book, Cooper speaks in the following modern words, "The art of dyeing is yet in its infancy. No one but a good chemist, who is at the same time a good dyer, can form any judgment of the very many unascertained points that yet remain in this art. I have felt this at almost every page of this work. It is in dyeing, as in all other branches of knowledge, a man must know much before he is aware of how ignorant he is."



A

PRACTICAL TREATISE

ON

DYEING,

AND

CALLICOE PRINTING:

EXHIBITING THE PROCESSES

IN THE

FRENCH, GERMAN, ENGLISH AND AMERICAN PRACTICE OF FIXING COLOURS ON WOOLLEN, COTTON, SILK, AND LINEN.

BY THOMAS COOPER, ESQ.

Professor of Chemistry in Dickenson College, Carlisle, Pennsylvania.

PHILADELPHIA:

PUBLISHED BY THOMAS DOBSON, AT THE STONE HOUSE, NO. 41, SOUTH SECOND STREET

William Fry, Printer

1815.

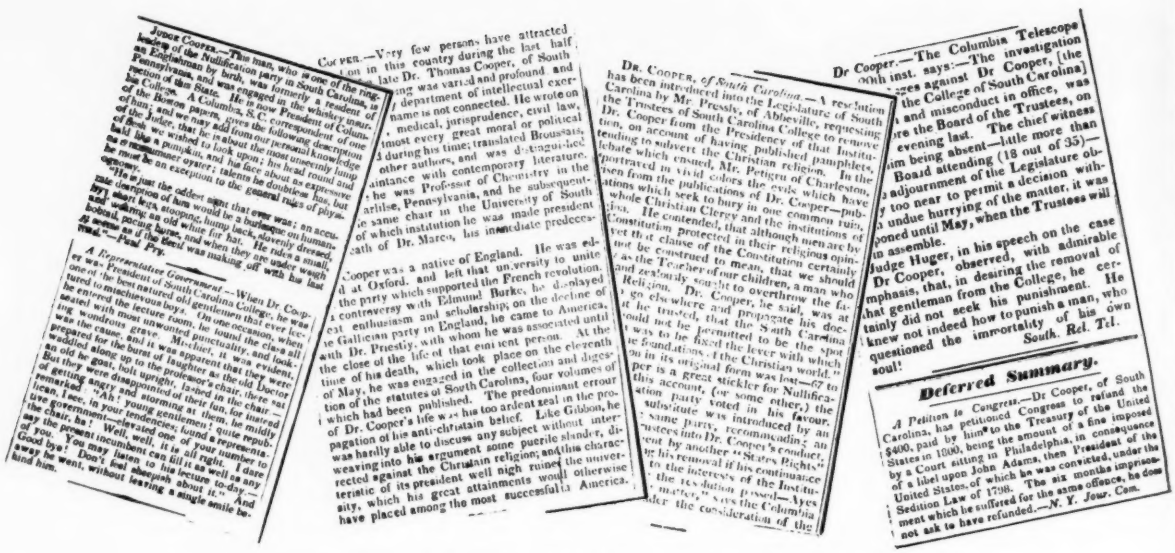
Title page of Cooper's book published in Philadelphia in 1815.

Old Dr. Cooper, of South Carolina, used to say to his students: "Don't be afraid of dirt, young gentlemen. What is dirt? Why, nothing at all offensive, when chemically viewed. Rub a little alkali upon the dirty grease spot on your coat and it undergoes a chemical change and becomes soap; now rub it with a little water and it disappears. It is neither grease, soap, water nor dirt. That is not a very odorous pile of dirt you see; scatter a little gypsum over it, and it is no longer dirty. Everything like dirt is worthy of notice as students of chemistry. Analyze it; it will separate into very clean elements. Dirt makes corn, corn makes meat, and that makes a very sweet young lady that I saw one of you kissing last night. So after all, you were kissing dirt, particularly if she whitened her face with chalk of fuller's earth, though I may say that rubbing such stuff on the beautiful skin of a young lady is a dirty practice. Pearl powder I think is made of bismuth, nothing but dirt. Lord Palmerston's fine definition of dirt is 'matter in the wrong place.' Put it in the right place and we cease to think of it as dirt; only there is a great deal of it in the wrong place."

A look at Cooper's lighter side.

As textile chemists and dyers, let us look back to 1790. In that year, near Manchester, England, the firm of Baker, Teasdale, Bridges and Cooper began bleaching with chlorine, a beginning made at the insistence of Thomas Cooper, who was quick to use and accept the latest chemical ideas. For over 2,000 years bleaching had been a long, drawn-out and unscientific process, which depended mainly on the action of sunlight. While different alkalies had been introduced from time to time and other minor changes made, near the end of the 18th century the process still consisted of alternate alkaline boiling of the goods, exposing to the sun, neutralizing in dilute sulfuric acid or even in sour milk, rinsing and then repeating the entire process again and again until the goods were a proper white. The discovery of chlorine in 1774 by Scheele sounded the death knell of the old process of bleaching, but it remained for Berthollet, a famous French chemist, to realize the practical possibilities of chlorine as a bleaching agent. Within a short time chlorine was adopted on a large commercial scale in Great Britain almost simultaneously by Thomas Cooper and James Watt (of steam engine fame). Thus the great industrial revolution really began.

When Cooper was in his thirties, he rushed to France in the midst of the Revo-



Various newspaper clippings attest to Cooper's controversial personality.

lution. Cooper's connection with the French Revolutionists made him a persona non grata in England and he migrated to the United States with his friend Joseph Priestley, the discoverer of oxygen.

Cooper was never afraid to speak his mind and to fight for liberty as he saw it. It wasn't long before he was in jail in Philadelphia for libeling President John Adams. Discussing this affair some time later, Cooper said, "It got me in jail where I stayed six months but there I had good company every day. At night I had the best company in Philadelphia. Everything that was good was sent to me—claret, Madeira, port, cider—everything came. God knows how or from where, and it cost me nothing. However, I had to pay a fine of $400."

Cooper devoted many years to chemical education and finally became professor of chemistry and later president of the University of South Carolina. In the South he was received with open arms and even President Jefferson sent his grandson to the university to study under Thomas Cooper.

Cooper's ardent interest in state's rights made him the spokesman for the nullification idea in South Carolina and the symbol of secession to most of the United States. In the South he was loved by some and despised by others but, as had happened many times before, Tom Cooper's bitter tongue and vehement pen finally got him into trouble even in South Carolina. Cooper died in Columbia in 1839 at the age of 81. His life was long and full. His influence was felt in many facets of the industrial and political life of this country. It is most fitting that such a pioneer of our modern textile industry lies buried in the area where today this modern industry has reached maturity.

REFERENCE

(1) Cooper, T, "A Practical Treatise on Dyeing and Callicoe Printing: Exhibiting the Processes in the French, German, English, and American Practice of Fixing Colours on Woollen, Cotton, Silk, and Linen". Published by Thomas Dobson, at the Stone House, No. 41, South Second Street, Philadelphia (1815).

CALENDAR OF COMING EVENTS

AMERICAN CHEMICAL SOCIETY
National Chemical Exposition—Oct 12-15, Chicago, Ill.

AMERICAN MANAGEMENT ASSOCIATION
23rd National Packaging Exposition—April 5-8, Convention Hall, Atlantic City, N J.

AMERICAN SOCIETY FOR QUALITY CONTROL
Meeting of the Carolinas Section—April 2, Clemson, S C.
Conference of the Carolinas, Georgia, Tennessee, Birmingham and Huntsville Sections—Nov 5-7, Chattanooga, Tenn.

Fifth Annual Conference on Textile Quality Control (Textile Division)—Feb 3-5, Clemson, S C.

AMERICAN SOCIETY FOR TESTING MATERIALS
Committee D-13 (Textile Materials)—Mar 17-19, Hotel Statler, New York, N Y.
Annual Meeting—June 13-18, Sherman and Morrison Hotels, Chicago, Ill.

AMERICAN TEXTILE MACHINERY ASSOCIATION
Exhibit of American Textile Machinery, April 26-May 1, Atlantic City Exhibition Hall, Atlantic City, N J.

CANADIAN ASSOCIATION OF TEXTILE CHEMISTS AND COLOURISTS
Meetings of the Quebec Section—Mar 20, April 23-24 (Montreal, Que); June 19 (Annual Golf Tournament).

CHAMBRE SYNDICALE TRAMAGRAS
International Detergent Congress—Aug 30-Sept 5, The Sorbonne, Paris, France.

DELTA KAPPA PHI FRATERNITY
1954 National Convention—April 2-3, Raleigh, N C.

DEUTSCHE GESELLSCHAFT FUR CHEMISCHES APPARATEWESEN
Achema XI—May 14-22, 1955, Frankfurt am Main, Germany.

DRYSALTERS CLUB OF NEW ENGLAND
April 30 (Hotel Vendome, Boston): June 25 (Annual Outing, Andover Country Club).

THE FIBER SOCIETY
Spring Meeting—May 5-6, Monticello Hotel and Thomas Jefferson Inn, Charlottesville, Va.
Fall Meeting—Sept 13-14, McGill University, Montreal, Canada.

INTERNATIONAL CONGRESS OF MAN-MADE FIBERS
May 31-June 3, Paris, France

LOWELL TECHNOLOGICAL INSTITUTE ALUMNI ASSOCIATION
Annual Reunion—April 28, Haddon Hall, Atlantic City, N J.

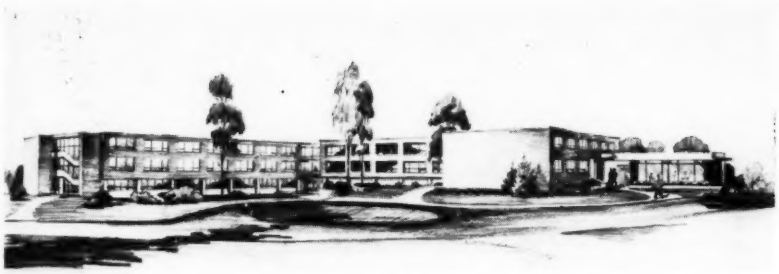
MANUFACTURING CHEMISTS ASSOCIATION, SOUTHERN ASSOCIATION OF SCIENCE AND INDUSTRY; and TEXAS CHEMICAL COUNCIL
1954 Southern Industrial Conference—April 21-23, Houston, Texas.

SOCIETY OF CHEMICAL INDUSTRY
Plastics and Polymers Group Meeting—March 24-26, Institution of Electrical Engineers, Savoy Place, London, England.

SOUTHERN TEXTILE EXPOSITION
October 4-9 (Textile Hall, Greenville, S C).

TEXTILE TECHNICAL FEDERATION OF CANADA
Exhibit—April, 1955, Show Mart, Montreal.

NEWS



Architect's sketch of proposed dormitory facilities at Philadelphia Textile Institute.

• New Dorms for PTI

Trustee approval of a $600,000 loan from the US Housing and Home Finance Agency for the construction of dormitory facilities at the Philadelphia Textile Institute has been announced by Theodore B Hayward, Chairman of the Board.

The dormitory unit, to house 150 students, will be built on the present college campus on the corner of School House Lane and Henry Avenue. Plans for this building are being drawn by George M Ewing Company, Philadelphia architects.

"The erection of this building," said Mr Hayward, "marks an important step forward in our five-million dollar development program. We feel that, with the construction of this dormitory, we will be able to increase greatly our services to our students, many of whom come from areas outside of Philadelphia as well as foreign countries."

Mr Hayward concluded by saying that he felt that occupancy of the dormitory would be scheduled for the fall semester 1955.

• Kumins Addresses NYPC

Charles Kumins, Interchemical Corporation Research Laboratories, served as guest speaker at the New York Pigment Club meeting on February 10th at Fraunces Tavern, New York, N Y. Mr Kumins spoke on "Ultramarine Blue".

• Additional Avcoset Licensees

Willow Fabrics, Inc and Pressman Gutman, Inc, have become the 25th and 26th converters licensed by American Viscose Corporation to convert rayon fabrics under the Avcoset program of quality control of washable rayon fabrics. There are also 13 finisher licensees.

• Stowe-Woodward to Build Roll Plant in South

Stowe-Woodward, Inc, Newton Upper Falls, Mass, has announced the acquisition on February 24th of a 16-acre tract of land at Griffin, Ga, for the construction of a new plant, which will be devoted to the compounding and application of rubber-roll coverings for textile finishing.

Modern equipment at the Griffin plant will be designed to produce rolls in a wide range of sizes up to 70" in diameter and 310" in length, it is reported.

The initial work force for the new plant will be hired locally, except for some highly skilled technicians. Ground will be broken as soon as the architect's plans are completed on the structure, which will cover about 25,000 square feet.

In announcing the acquisition, E W Peterson, Stowe-Woodward's president, said that the new plant was one step in projected plans to broaden the scope of the 68-year-old company's service to the textile and paper industries.

No change in the operation or personnel of the main plant is contemplated.

• BEC Establishes Greenville Office

Brush Electronics Company, Cleveland, Ohio, has established a Brush Southeastern textile instrument sales and service office at 91 Cleveland St, Greenville, S C, under the direction of D M Gaskill, supervisor of BEC's Textile Section.

It is expected that routine service concerning the Company's Uniformity Analyzer will be expedited by means of this new facility, as a complete stock of spare and operating supplies will be available.

• Stowell to Represent TIW Division in South

The Textile Division of Tower Iron Works, Providence, R I, will be represented in the Southern areas by L C Stowell Engineering Co, Charlotte, N C. The Charlotte firm will serve as sales representatives for TIW's line of wet-finishing equipment.

• New Firm Organized in Massachusetts

Fiber Research Corporation was organized last month as a Massachusetts company to undertake the commercial development of certain research activities of National Research Corporation, Cambridge, Mass, relating to equipment for the grading of natural and synthetic fibers.

Willard Bridges, of Walker Top Associates and president of the new company, stated that "the accurate and rapid determination of the physical properties of wool and other fibers has long been a serious problem in the textile industry. It is our hope that through the medium of Fiber Research Corporation some of the developments of National Research Corporation in this field can be more rapidly made available on a commercial scale for the benefit of our industry."

Initial capital for Fiber Research in the amount of $100,000 reportedly has been supplied by Walker Top Associates in exchange for preferred stock. This company retains 60% ownership in the new company; the remaining 40% has been acquired by National Research Corporation in exchange for assignment of certain rights to its present developments in the field.

Other officers of Fiber Research are Kenneth G Donald, National Research Corporation, *treasurer;* and John R Quarles, Ropes, Gray, Best, Coolidge & Rugg, *clerk.*

Messrs Bridges and Donald are also directors of the new company along with E Bradford Keith, Walker Top Associates; Richard S Morse, National Research Corporation; Richard M Nichols, Goodwin, Procter & Hoar; B Harrison Cohan, Walker Top Associates; and James Stannard, Walker Top Associates.

• New Price Reductions

Price reductions in diisopropanolamine, triisopropanolamine, methyl vinyl ether-maleic anhydride copolymer, dichlorodimethylhydantoin, phenyl methyl carbinol, Ketosol solvent 75, and glacial methacrylic acid have been announced in recent weeks by five manufacturers.

Carbide and Carbon Chemicals Co, a Division of Union Carbide and Carbon Corporation, has announced reductions of 5¼¢ lb for diisopropanolamine and 6¢ lb for triisopropanolamine for both carload lots and less carload lots in drums. Current prices are:

EASTERN TERRITORY (EAST OF IDAHO, UTAH, AND ARIZONA)

	Diisopropanolamine	*Triisopropanolamine*
Tank car lots, per lb	22.0¢	23.0¢
Carload lots in drums, per lb	24.0¢	25.0¢
Less carload lots in drums, per lb	25.0¢	26.0¢

All shipments of 55-gal drums or more are fob delivery point of rail carrier nearest point of destination. Prices in the Western territory are one cent per pound higher.

Carbide has also announced reductions of 10¢ lb for phenyl methyl carbinol and 7¢ lb for Ketosol solvent 75 for less carload lots in drums. In these quantities, phenyl methyl carbinol is now 50¢ lb and Ketosol solvent 75 is 48¢ lb, fob Institute, W Va. Both solvents are said to be excellent dye carriers for Dacron acetate dyes.

General Aniline & Film Corporation has substantially reduced the price of PVM/MA (methyl vinyl ether-maleic anhydride copolymer) to 80¢ lb in carload lots. PVM/MA Half Amide has also been reduced to 75¢ lb in carload lots. Both are produced in semicommercial quantities and are available in a number of viscosity ranges.

Wyandotte Chemicals Corporation has again reduced the price on Halane, their dichlorodimethylhydantoin, an active chlorine-liberating material used in dry bleaching compounds. The following prices now prevail:

Truck- or carload	50¢ lb
Drum quantities	60¢ lb
Less than drum	75¢ lb

All prices fob Wyandotte, Mich

Rohm & Haas Company has announced another reduction of 20¢ lb in the price of glacial methacrylic acid, the second reduction in two months.

New prices, fob Bristol, Pa are as follows:

Truck- or carload, drums	54.5¢ lb
Less than truckload, drums	55¢ lb
Less than drum quantities	65¢ lb

• TTFC Favors Canadian Facilities for Textile Degrees

The Textile Technical Federation of Canada favors the creation of educational facilities to enable students to obtain a degree in textiles through a Canadian university, it was announced following a recent general meeting of the association at Hamilton. A practical step of this nature, it was believed, would immeasurably benefit the Canadian industry as more and better-qualified personnel would inevitably become available. Moreover, Canadians with an academic background in textiles would find increased opportunities for advancement in the field.

"Textile education", remarked TTFC president John W Millichamp, "is so important that our directors propose to make a general review and report on the subject at our annual meeting in April."

• American Rayon Institute to Move Into Permanent HQ on May 1

The American Rayon Institute, formerly the Rayon Information Center, plans to move into permanent headquarters in the Empire State Building, 350 Fifth Ave, New York, by the first of May. In the meantime, temporary space on the 77th floor of the Empire State Building is providing offices for Benjamin Wood, executive director, Jeanne Pierre, director of fashion, and other staff members.

Plans for the permanent quarters include a conference room and a display room in addition to offices. A "living library" of rayon fabrics is to be developed, and showings will be held for out-of-town buyers, resident buyers, industry executives, designers and the press. The conference room will be used for trade and industry meetings and will also serve as a director's room for the Institute's board of governors.

The sponsors of the Institute are: American Bemberg, American Enka Corporation, American Viscose Corporation, Courtaulds, Inc, E I du Pont de Nemours & Co, Inc, Hartford Rayon Company, Industrial Rayon Corporation, North American Rayon Corporation, and Skenandoa Rayon Corporation.

• AMA Packaging Exposition

The American Management Association's 23rd National Packaging Exposition next month in Atlantic City, N J, will be the largest in the history of the event, according to AMA spokesmen. Nearly 400 exhibitors will utilize more than 143,000 sq ft of floor space at Convention Hall.

The exposition, one of the largest trade shows in the country, will be the highlight of National Packaging Week (April 5-8). Concurrent with it will be the annual AMA Packaging Conference.

• Dow Corning Silicones Ltd Doing Business from New Office

Dow Corning Corporation's recently organized Canadian subsidiary, Dow Corning Silicones Ltd, began doing business on February 1 from its new office and warehouse on Tippet Rd, Wilson Heights, Toronto, Ont.

Conveniently located in metropolitan Toronto, the new building contains 2000 sq ft of office space and 100,000 sq ft of warehouse area. Dow Corning Silicones Limited has taken over the sales service and warehousing operations, which since 1945 have been carried on by Fiberglas Canada Limited as Canadian distributors of Dow Corning products. The Fiberglas personnel who have been engaged in the sales of silicones have been taken into the employ of the new company.

D C R Miller serves as general manager of the new company. Mr Miller, an experienced product development engineer, served as manager of the Dow Corning Products Division of Fiberglas Canada Limited since the beginning of its sales activities on silicone products. Prior to 1945, Mr Miller was a development engineer on glass products for Fiberglas Canada.

Executive officers of the new company are W R Collings, president; Shailer L Bass, vice president, Wm C Blackburn, secretary; and Burl D Huber, treasurer. The Board of directors is composed of Dr Bass, Mr Blackburn, Olin D Blessing, Dr Collings, Howard N Fenn, Mr Huber, Ira W Hutchison and Mr Miller.

• Fleming Discusses "Science" Fibers at CATCC Meeting

Myron T Fleming, executive vice president of Proctor and Schwartz, Inc, Philadelphia, outlined some of the dyeing and finishing problems associated with the new "science" textile fibers, i e, Orlon, Acrilan, Dacron, Vicara, etc, at the February 20th meeting of the Quebec Section, Canadian Association of Textile Colourists and Chemists, held at McGill University, Montreal. He stated that the blending of the new fibers with each other or with the natural fibers presents the largest problem, but assured that many new mechanical and chemical techniques being worked out in textile laboratories everywhere would ultimately result in the solution.

The subject of blends highlighted the January meeting of the Section as Emile Carrier, The Montreal Cottons Ltd, and H C Mersereau, Canadian Industries, Ltd, discussed their possibilities for producing a variety of fabrics for upholstery, drapes, carpets and other household and industrial uses.

• Solvay to Move Moundsville Products by Barge

Solvay Process Division, Allied Chemical & Dye Corporation, has announced plans for barge movement of products from its new Moundsville, W Va plant to serve customers on or near the inland waterways of the Ohio River and its tributaries.

Contract has been awarded to Pihl & Miller of Pittsburgh for construction of a barge-loading dock at the Moundsville plant, which, it is expected, will be completed within the next month.

Solvay's Moundsville plant, which started operations last December, now produces chlorine and caustic soda. In mid-summer it is expected that production of methyl chloride, methylene chloride, chloroform and carbon tetrachloride will commence in facilities now under construction.

The new dock will also be available for shipment of products from the National Aniline Division, which recently went into production of nitrobenzene and aniline at its Moundsville plant and will later produce maleic anhydride and fumaric acid.

In addition, new facilities will make possible receipt of raw materials and supplies by barge at both the Solvay and National Aniline plants.

• ΔΚΦ Alumni Chapter Formed in Atlanta

Delta Kappa Phi fraternity has formed an alumni chapter in Atlanta, Ga, with the following charter members: S M Willis, G O Lindsey, G B Fletcher, W D Cawley, C R King, E N Young, Jr, W Postman.

All alumni in the area should contact E N Young, Jr, 404 W Ware Ave, East Point, Ga, to be put on the mailing list.

* * * *

The fraternity will hold its National Convention, April 2-3 at Raleigh, N C with Kappa Chapter (N C State College School of Textiles) the host.

• PTI Alumni Hear Jackson

250 Alumni of the Philadelphia Textile Institute were told last month that surpluses of raw cotton and textiles would disappear "if the cotton consumption capacity of the world were permitted to express itself".

Speaking before the 53rd Annual Banquet of the PTI Alumni Association at the Warwick Hotel on February 6th, Robert C Jackson, executive vice president of the American Cotton Manufacturers Institute, based many of his observations on a report "The Cotton Textile Industry and Foreign Economic Policy", which is due to be made public shortly by the ACMI.

• 22 Hooker Employees Receive Awards

The Hooker Electrochemical Company recently awarded suitably inscribed solid gold wrist watches to 22 active and retired employees in recognition of 25 years of service to the company. The gifts were presented by R L Murray, president, at a buffet supper at the Niagara Falls, N Y, Country Club.

Twelve of the recipients received watches even though their 25 years of service had not been continuous. This brought the total of recipients of watches to 158 of which 150 were able to be present along with virtually all of Hooker's management to offer congratulations.

The oldest employee still in active service has worked for Hooker for 41 years.

• Labeling and Marketing Symposia

Two symposia of interest to the chemical industry will be extra features of the Eighth National Chemical Exposition to be held in the Chicago Coliseum October 12 to 15.

One will deal with the packaging, transportation and precautionary labeling of chemicals and will be sponsored by the Manufacturing Chemists' Association.

The second, sponsored by the Chemical Market Research Association, will deal primarily with the special problems of exposition marketing, in which the Exposition itself will be offered as "clinical material" for study by the speakers.

The two symposia will combine with the already announced Industrial and Engineering Chemistry Lecture Series.

The Exposition and its accompanying programs will revolve around the theme: "The Chemical Industry in Everyday Living."

• Achema XI

Achema XI, the world's largest chemical plant and apparatus exhibition and congress, will again be held in Frankfurt am Main, Germany, May 14-22, 1955. The exposition will occupy eleven permanent buildings on the Fair Grounds of the city of Frankfurt, with over 500,000 sq ft of space in the exhibition halls. A full program of technical papers and plant trips will be held at the same time. Both the exposition and the congress are sponsored by the Deutsche Gesellschaft für Chemisches Apparatewesen (Dechema). Over 500 exhibitors have already reserved space in the exposition. Over 48,000 visitors attended the last Achema, and this record is expected to be surpassed in 1955.

Additional information, including floor plans and regulations (in English) may be obtained from the Chicago Section of the American Chemical Society, 86 East Randolph Street, Chicago 1, Illinois.

• Chemical Progress Week Planned for May 17-22

The important role of the chemical industry in American life will be brought to thousands of Americans in their own communities by members of the Manufacturing Chemists' Association during the first annual Chemical Progress Week, May 17-22. The MCA Board will act as the national sponsoring committee for Chemical Progress Week.

On the basis that the best people to tell Americans about the chemical industry are their neighbors who work in it, most of the Chemical Progress Week programs will be carried out in the communities of nearly 5,000 plants across the nation of MCA member companies.

Where two or more plants exist in a community, plant managements will be asked to form community committees. Representatives of many of the member companies have volunteered for special assignments for the industry observance and the work will be coordinated by the MCA Public Relations Department at 1625 Eye St, NW, Washington, D C.

• Dynel Work Clothes Said to Cut Costs

The new type of heavy-duty Dynel work clothing recently introduced by Chem-Wear, Inc, Darien, Conn, is said to be showing promise of reducing heavy-duty garment costs for men working under nearly any conditions that require protection from heat or cold.

The fabric in the new garments is a melton containing 25% Dynel and 75% reprocessed wool. It is available in a fabric weight of 20 oz per sq yd. Results of strength tests on the fabric reportedly show that it averages 10% to 15% stronger than all-wool of the same weight, and the blended fabric has at least 40% higher tear strength.

"Experience with all-Dynel Chem-Wear garments in chemical plants and storage battery manufacture points up the advantages of this fiber for all-around chemical resistance," according to E S Smith, Chem-Wear vice president. "Now, with this combination of Dynel and acid-resistant wool . . . we expect that, in all cases, the new fabric will increase the garment's life expectancy by 35% to 40%. Further, for men who weld or work near furnaces, this new blended cloth offers unusually good protection against sparks, drops of molten metal and intense heat."

"The new fabric, while not classed as nonflammable, does not sustain combustion and shows no after-glow of char on the ASTM D 626-41T test. The length of char was short, varying from 2½ to 3 in on this stringent test. In warmth tests, the fabric has heat insulation equal to that of new wool in the same construction," Mr. Smith added.

• New Auditorium at ITT to Honor Stuart Cramer

One of the South's famous builders of industry, the late Stuart W Cramer, is honored by a memorial auditorium now under construction at the Institute of Textile Technology, Charlottesville, Va. Members of the Institute's Technical Advistory Committee recently broke ground for the building and ITT officials expect it will be ready for use shortly.

Funds for the structure, which will provide enlarged facilities for seminars, annual mill member conferences, gatherings of national scientific and textile organizations and similar meetings, were provided several years ago by Callaway Mills and Callaway Institute, Inc, of LaGrange, Georgia.

To be dedicated as the Stuart W Cramer Memorial Auditorium, the new structure honors an industrialist who during the period from 1895 to 1918 designed, laid out and equipped more than 150 cotton mills.

ITT officials termed the building a "living memorial" to Mr Cramer because it will fill a need for improved facilities in pursuance of research and educational objectives closely related to Mr Cramer's lifetime interests.

The structure will fill one side of a "research quadrangle," which is the center of the ITT campus, in company with the present administration and applications buildings of the Institute.

• Position for Textile Analyst

The Treasury Department Bureau of Customs has announced an opening in its laboratory for a textile analyst. The position can be filled at grades GS-5, GS-7, or GS-9 level with starting salaries of $3410, $4205, and $5060 per annum, respectively, depending upon the applicant's qualifications and experience.

For GS-5, applicants preferably should have a B S degree in textile, but consideration will be given to applicants who have received substantial education in a textile school above the high school level. No experience is required.

For GS-7, same as for GS-5 plus a familiarity with the different processes used in the manufacture of textiles, including spinning, weaving, knitting, finishing, etc. They should have had at least 1 year of practical experience in 1) the identification of natural and synthetic fibers, including wool, cotton, silk, rayon, linen, and hard fibers, as well as other animal, vegetable, and synthetic fibers; 2) determining the methods used in spinning, weaving, finishing, etc of textiles by the examination of samples.

For GS-9, the same as GS-7 plus 2 additional years experience of the kind required for GS-7.

Those interested should contact E F Kenney, chief chemist, Customs Laboratory, 201 Varick St, New York 14, N Y.

• RISD Textile Scholarships

The Rhode Island School of Design Textile Scholarships have been established and will be awarded on a competitive basis to seven public and private secondary school seniors completing application by April 10.

Two $2,200 scholarships covering full tuition for four years and five part-tuition four-year scholarships of $1,200 have been set up by the College using part of the income from the Rayon Foundation Trust, a fund established some years ago to benefit the School of Design's textile program.

In announcing the scholarships, Max W Sullivan, RISD president, noted that the tense textile situation in New England has caused a serious decline in the number of high school students who are showing an interest in entering the textile field. "This scholarship plan," he said, "is only one phase of a program we are now launching in an effort to arrest and reverse this trend."

Applicants for the textile scholarships should apply in writing to the Director of Admissions, 2 College Street, Providence. The scholarships are open only to students wishing to become candidates for Bachelor of Science degrees in Textile Engineering with majors in either Textile Manufacturing or Chemistry and Textile Coloring.

Applicants must meet the regular entrance requirements of the College. Awards will be made on the basis of scholastic ability, need, and general promise and will be announced on or about May 15.

• Canadians Urged to Measure Cloth Properties More Scientically

Canadian textile producers have been urged by Dean Foster, dean of laboratories, U S Testing Co, Hoboken, N J, to measure more scientifically how clothing makes the wearer feel warm or cool.

In an address at the regular meeting of the Textile Society of Canada, Eastern Division, in Montreal on January 30th, Mr Foster said that psychological factors as well as the construction of the cloth entered the picture. He warned that a textile producer who turned out a lot of cloth designed for hot weather wear might lose a lost of money if the people who wore it did not "feel" cool.

It was possible, he said, to test the psychological as well as the physical properties of cloth and producers would do well to have such tests made particularly in regard to fabrics with which they have not had much previous experience.

• LTI Inaugurates Industrial Management Course

Nathaniel M Mitchell, president of Barnes Textile Associates, served as keynote speaker as Lowell Technogical Institute inaugurated a new Industrial Management course on Feb 2. Mr Mitchell spoke on "How to Make an Engineering Survey".

The course features a nationally known team of management consultants as lecturers. Some of the subjects to be presented will be: Mechanical and Operating Surveys, Job Description and Evaluation, Operating or Frequency Studies, Time Study MTM and BTA Methods, Production and Task Calculation, Incentive and Rate Setting, Methods and Materials Handling, Accelerated Training, Attitude Surveys and Production Engineering and the Cost Department.

* * * *

LTI's Evening Division began its second term classes on February 8 with another record enrollment. Close to 1000 evening school students, the majority of whom are working people in the local area, have enrolled for classes in 56 courses in electronics, engineering, chemistry, paper, plastics, leather, art, textiles and general subjects. The second term record enrollment boosted the total enrollment figures for the 1953-1954 academic year to almost 2300 registrants, by far the largest enrollment in the 56-year evening school history at Lowell Tech.

• NCSC Students Contact NC High Schools

A group of eleven students in the School of Textiles at North Carolina State College have completed speaking engagements in nine of the State's high schools.

Marvin Crow, chairman of the student committee on high school visitation, has stated that the group traveled a total of 2,200 miles and addressed approximately 2,000 high school students during the current school year.

The talks were devoted mainly to the value of college training, a report on the types of education offered at State College, and a statement on the student activities and educational programs in the School of Textiles.

• "The Sixty-Plus Club Bulletin"

To help employers counsel aging employees and pensioners on adjusting themselves to "workless" living, the National Foreman's Institute, New London, Conn, is sponsoring the monthly "Sixty Plus Club Bulletin", a service stemming from several years' research into ways and means of keeping pensioners interested and "off the shelf".

The bulletin is supplied in bulk to employers. Sample copies are available on request.

NAMES IN THE NEWS

R A Behrmann

EMERY INDUSTRIES, INC, Cincinnati, has announced the appointment of ROBERT A BEHRMANN as director of purchases. He fills the position vacated by K K BOYD sometime ago when the latter was elected vice president in charge of sales and purchases.

Mr Behrmann has had experience with Emery in the market development of new products as well as technical service on Emery's standard line.

B M JONES of Jones & Hunt, Inc, Gloucester, Mass, will be exclusive sales representative in the New England Territory for the sale of McKiernan-Terry textile finishing equipment, it is learned.

Since the early thirties when he was managing editor of the American Dyestuff Reporter, Mr Jones has been engaged exclusively in the engineering and selling of textile processing equipment. For some time previous to opening his own sales agency, he was general sales manager of Rodney Hunt Machine Company.

NEWLY elected president of the National Institute of Drycleaning is WALTER R DUNCAN of Bornot, Inc, Philadelphia. Mr Duncan was chosen to head the Institute for the next two years at the 45th National Convention of NID in Washington last month.

FRANK A PRATHER, Prather's Drycleaning Company, Ft Myers, Fla, was elected vice-president to serve with Mr Duncan.

ROBERT KIZER, Asheboro Launderers and Cleaners, Asheboro, N C, was elected to the Board of Directors to fill out the remaining year of Mr Prather's unexpired term. He represents District #8.

Other new directors are: *District* #4— SAM DARKO, Darko and Son, Indianapolis, Ind; *District* #7 — THOMAS OGDEN, Spitzer Cleaners, Richmond, Va; *District* #9 — EARL RUSH, French Unique Cleaners, Alexandria, La; and *District* #10 — W E BRASEL, Brasel Cleaners, Clinton, Okla.

G H Eudy

GEORGE H EUDY has been appointed Southern representative of Onyx Oil & Chemical Co, Jersey City, N J.

His background has been with the Kerr Bleachery in Concord, N H as a dyehouse trainee, and, from 1951 to 1954 as Greensboro Chemical Division manager with F H Ross Co, Inc, selling heavy chemicals to the textile and industrial trades.

A E Powell

ALCO OIL and CHEMICAL CORPORATION, Philadelphia, announces that A E POWELL has joined its sales staff and will assist in the development and service of new products.

In 1945 Mr Powell helped form the Pioneer Latex and Chemical Company and was affiliated with this Company as treasurer and vice president in charge of rubber sales until his resignation last year.

ALBERT C NUESSLE, Rohm & Haas Co, and RUSSELL F CRAWFORD, JR, American Viscose Corp, were honored recently by the Glycerine Producers' Association for their work in combining glycerine with polyacrylic acid to impart a wash-fast finish to nylon, especially nylon lace. The research accomplishment was judged third in the Glycerine Research Awards for 1953, which were presented at the GPA's annual meeting in New York in January.

G W Russell

THE appointment of GEORGE W RUSSELL as assistant general manager of American Cyanamid Company's newly formed Pigments Division was announced on February 23rd.

Mr Russell joined Cyanamid's Market Development Department in 1946. During the next two years he served in the Technical Department and New Products Development Department of Cyanamid. He became assistant sales manager of the Industrial Chemicals Division in 1949, and in 1953 was made manager of the Manufacturers Chemicals Department of the same Division, a post which he held until this most recent promotion.

S JACK DAVIS, councilor and former chairman of the Southeastern Section, AATCC, has been named senior group leader in charge of the newly established Textile Research Section of the Research Department for The Chemstrand Corporation, Decatur, Ala.

Mr Davis joined Chemstrand in March, 1952, and was in charge of coordinating activities in textile research. He previously was associated with Callaway Mills, LaGrange, Ga, for 11 years, where he was successively research chemist, chief chemist, and assistant to the director of research.

HOOKER ELECTROCHEMICAL CO, Niagara Falls, N Y, has announced the following moves within its sales department: WILLIAM L GILLESPIE has been appointed Chicago district sales manager, VICTOR M MORGAN has been made a sales representative with headquarters at the Chicago district sales office, and GREGORY J PERREAULT has been named field salesman with headquarters at the New York district sales office.

Mr Gillespie, who came to Hooker in 1939, replaces CHARLES Y CAIN, who has been promoted to manager, plastic sales.

M B Hays

IN celebration of its second birthday, "Air Scoop", the newspaper of the Naval Air Material Center, Philadelphia, Pa, began a new feature in the January 15th issue to inform employees of NAMC of the different kinds of jobs held by women working there.

To begin the series, Air Scoop interviewed MARGARET B HAYS, supervisory technologist of textiles in the Aeronautical Materials Laboratory.

Following a review of Miss Hays' career, the article discusses several of the different projects under way at the "Lab", including the testing of fabrics for lighter-than-air craft, testing of various wool-synthetic combinations made into pile fabrics, testing upholstery fabrics for use in aircraft, development of fabrics for flight clothing, evaluating commercial mothproofing compounds, and development of a method of applying a flame-resisting compound to a garment when it is laundered.

The article concludes with the paragraph . . . "The overall work done through this competent supervisor results in greater comfort, economy and durability of many Navy products . . . contributions of a woman at work at NAMC."

HENRY A RUTHERFORD, head of the Department of Textile Chemistry, School of Textiles, North Carolina State College, has assumed the additional duties and title of director of chemical research.

In addition G MEARES RANDOLPH has been appointed as research associate in charge of dyeing projects. Professor Rutherford will be assisted in his new duties by Mr Randolph and J GLENN TEMPLETON, research associate in charge of chemical-engineering projects.

Professor Rutherford's appointment completes the formal organization of the Chemical Research Division of the Department of Textile Research at the School of Textiles. The new division will be a counterpart to the already active Processing Research Division of which J F BOGDAN is director.

Walter F Fancourt III, Phi Psi Fraternity Alumni President, is shown congratulating Dean M Lewis, Colonial Piece Dye Works (second from left) and Horace T Greenwood, Globe Dye Works (third from left) upon their being named honorary members. David McConaughy, president of Alpha Chapter (Philadelphia Textile Institute) looks on. The ceremonies took place at the fraternity's annual Founder's Day Banquet on February 15th at the Anchorage Restaurant, Philadelphia, Pa.

TEN of New England's eminent edutional, financial, and industrial leaders have accepted appointment to the Board of Visitors of Lowell Technological Institute.

The Board will visit the Institute from time to time in order to facilitate the integration of the Institute's educational and research programs with industry and the community at large.

The members include: CHARLES F ADAMS, JR, Raytheon Manufacturing Company; GEORGES F DORIOT, American Research and Development Corporation; JOSEPH A ERICKSON, Federal Reserve Bank of Boston; JACOB J KAPLAN, Nutter, McClellan and Fish; JAMES R KILLIAN, JR, Massachusetts Institute of Technology; RALPH LOWELL, Boston Safe Deposit and Trust Company; DANIEL I MARSH, Boston University; RICHARD PRESTON, Commonwealth of Massachusetts Department of Commerce; EARL P STEVENSON, Arthur D Little, Inc; and LAWRENCE F WHITTEMORE, The Brown Company.

THE first Commonwealth of Massachusetts Scholarships Award winners were announced recently by President Martin J Lydon at Lowell Technological Institute. The sum of $2500 was set aside by the last session of the Massachusetts State Legislature for the establishment on a yearly basis of ten scholarships to be awarded to deserving freshman students who are residents of Massachusetts.

The ten scholarship winners are BRENDAN F CASSIDY, Lowell; ROY M COWDREY, Greenfield; THOMAS M KEVILLE, JR, Lowell; LEO A HART, Lawrence; FREDERICK R LYNCH, Lawrence; JOHN E LYNCH, JR, Brookfield; EDWARD L McGANN, Lowell; GLEN R PARKER, JR, East Pepperell; THERESE A POLAK, Lowell, and PAUL A TREMBLAY, Lowell.

TWO new appointments in the marketing section of General Electric Company's Silicone Products Department have been announced. WILLIAM S KATHER is now supervisor — water-repellent silicone sales development, and MILTON C LAUENSTEIN assumes supervision of rubber fabricating industry sales development. Both men will be located at department headquarters in Waterford, N Y.

D S HAMBY of the School of Textiles at North Carolina State College has been invited to appear on the program of the International Congress of Man-Made Fibers in Paris, France, on June 2.

Prof Hamby, who teaches courses in synthetics and quality control, will speak on "Recent Textile Machinery Developments and Trends Relating to Man-Made Fibers".

OBITUARY

G I BOSTICK

GEORGE I BOSTICK, Tex-Lane Dyeing and Finishing Co, Brooklyn, N Y, died on Friday, February 19.

A resident of Manhasset, N Y, for the past fifteen years, Mr Bostick had a long and distinguished career in the industry. Following his service with the Artistic Dyeing Co, Mr Bostick went into a partnership for a short time before going with Antipyros Company of Brooklyn, where he spent 13 years from 1935 to 1948. He went with Hudson Piece Dye Company in 1948 serving the Paterson, N J concern as a vice president. He began selling for various dyestuff concerns for a period of two years before going with Tex-Lane recently.